

SCIENCE.

FRIDAY, APRIL 15, 1887.

COMMENT AND CRITICISM.

WE DESIRE TO OFFER to our readers from time to time discussions on questions of present educational interest by men of prominence in the teaching profession. The first of these discussions is printed in this issue, and deals with the question as to what industry can profitably be introduced into country schools. The contributors are Pres. Francis A. Walker of Boston, Charles H. Ham of Chicago, and Superintendent Samuel G. Love of Jamestown, N.Y. The question was put as to country schools because there are certain conditions peculiar to them. As a rule, they are not so carefully organized nor so well managed as city schools. Their resources are usually less, and their opportunities fewer, than those possessed by the schools of the town or the city. And in this one particular of the introduction of an element of industrial training, the country school is at a disadvantage. It is cut off from using many forms of industrial training that are at hand in the city; and on this and other accounts it merits separate consideration. It is to be borne in mind that industrial work can only find access to the schools in so far as it is educational. As manual or technical instruction, there is no room for it save in institutions created especially for it. The schools can, must, and will welcome it as an educational factor. Its theoretical value is conceded: it remains to solve the practical questions as to just how it can be introduced. What changes must be made to accommodate it? What re-adjustments and re-arrangements are necessary? These are pressing questions just now.

GEN. JAMES B. FRY, in a paper on compulsory education in the army, takes occasion to go at length into the subject of public-school education. In fact, this forms by far the larger portion of his pamphlet, the considerations relating to the army being relegated to a few pages at the end. General Fry's language is strong and direct, and he is very much opposed to compulsory education in particular and to the public-school system in general. His argument is, in brief, that compulsory

education by the state involves a pernicious assumption of power, and that the state's expedients and processes necessarily call for official surveillance and intermeddling, which, to be effective, must be arbitrary and vexatious, and which are hostile to our institutions and to the feelings of self-reliance and personal independence born and bred in our people. It deprives parents of responsibility for their children, the writer contends, and does this at the expense of a part of the community; and, however high its pretensions, it cannot be free from the demoralization that results from giving alms by law.

We must confess that this seems to us very silly. General Fry appears to have fallen a victim to platitudes and that most curious cry of 'pauperizing the intellectual classes' which is now so often heard. To which of our 'institutions' is the public-school system hostile? We have an idea that it is the chiefest of them as well as their centre. This subject has been gone over so often that it is hardly worth while treating it again. But we could not resist the temptation of merely indicating how even so serious and well-meaning a writer as General Fry may be totally misled by words, when he does not pause to weigh carefully the ideas for which they stand.

WHY THE WALLS of the stomach and intestine are not themselves digested by their own fluids has for more than a hundred years been a mooted question in physiology. John Hunter, in a paper read before the Royal Society in 1772, maintained that it was because these tissues were living, or, as he expressed it, "animals, or parts of animals, possessed of the living principle, when taken into the stomach, are not in the least affected by the powers of that viscus so long as the animal principle remains; hence it is that we find animals of various kinds living in the stomach, or even hatched and bred there: yet, the moment that any of those lose the living principle, they become subject to the digestive powers of the stomach." Other theories have been advanced to explain the facts in the case, but all are unsatisfactory. Dr. J. W. Warren contributes an article to the *Boston medical and surgical journal*, in

which he reviews the evidence presented by those who have maintained these several theories, and gives the results of some twenty experiments of his own made on fifty frogs. He suspended the legs of the frogs while living in an artificial gastric juice (that is, pepsin and hydrochloric acid), and found that the muscular tissue was digested, as was shown by the presence of peptone, the frog remaining alive throughout the experiment. When acid alone was used without the pepsin, the muscle was softened and dissolved, but not peptonized, and therefore not digested. It thus appears that living tissues may be digested, and that the problem is as far from solution as ever. Dr. Warren comes to the same conclusion, but promises to investigate the subject more fully in the future.

IN A RECENT NUMBER of *Science* we referred to the experiments of Dr. T. M. Prudden on bacteria in water, with special reference to the ice-supply of New York City. These experiments were not confined to the water, but included also the ice itself. These observations show that ice formed in the Hudson River near Albany contains vastly greater numbers of bacteria than that found at some distance below, but that, notwithstanding the fact that the water of the river is freed to a certain degree from bacteria after running some distance, the average number of bacteria left in the ice is considerably above that which can be regarded as wholly safe. Samples of ice from the various lakes and ponds from which the supply of New York is taken have also been analyzed. The general conclusions to which Dr. Prudden has arrived may be thus summarized: 1°. A biological analysis of water and ice will detect the presence of bacteria, some species of which can give rise to serious disease, but a great deal of careful study of other conditions is still necessary in order to determine whether the water or ice is suitable for use or not; 2°. In freezing, water purifies itself only partially, the gross particles and some of the materials in solution being removed, but the bacteria remain to a considerable extent unaffected; 3°. Different species of bacteria possess differing degrees of vulnerability to the action of low temperatures; 4°. The bacillus of typhoid-fever and the common bacteria of suppuration are capable of resisting a prolonged exposure to a low temperature with the destruction of a part only of the individuals thus exposed; 5°. Experimental data justify the belief that in

natural waters there may be a purification of about ninety per cent; 6°. In filtration of water the various species of bacteria, dangerous and harmless, are eliminated with about equal efficiency, while in freezing the dangerous disease-producing species may be retained if they resist low temperatures, while more or less of the harmless forms may be destroyed; 7°. The ice supplied to New York comes from a series of naturally excellent lakes and ponds, and from a great tidal river largely contaminated in its upper regions, and by far the larger proportion of the ice comes from the latter source; 8°. A very much greater number of bacteria are found in snow-ice and in the very bubbly streaks than in the transparent ice, particularly in the snow-ice on the top of the cakes; 9°. The average number of bacteria in ice from all sources taken together is far beyond the general standard which even a moderate degree of purity would allow; 10°. The transparent ice from some of the lake and pond sources presents in general a most admirable degree of freedom from bacteria.

In interpreting the results which he has reached, Dr. Prudden states that typhoid-fever, and diseases associated with acute suppuration and the so-called blood-poisoning from wounds, or pyaemia, are almost constantly present in large towns like Troy and Albany, and frequently so in villages like many of those which lie along the upper Hudson; and that his experiments have shown that the bacteria causing these two forms of disease are markedly resistant to the temperature at which ice forms. He estimates that in Albany alone, there are, on an average, fifty cases of typhoid-fever whose excreta pass into the Hudson River each year during the ice-forming season. He also finds that in that city there is no systematic disinfection of the typhoid discharges, which therefore enter the sewers, and subsequently the river, with their myriads of bacteria in a living condition. Dr. Prudden recommends that the state board of health, or other authority, shall have full control of the ice-harvesting fields, and determine which, if any, of the sources of ice-supply are so situated as to imperil the health of the consumers of the ice. In addition to this, a compulsory system of disinfection of excreta in infectious diseases should be instituted. He also thinks that artificial ice might, perhaps, be substituted for the natural ice. In concluding his very valuable paper, the writer expresses his sincere hope that his

study and conclusions may not be looked upon in a sensational light, nor regarded as a polemic against ice companies and dealers, or against the free and wonted use of ice, the incalculable usefulness of which is beyond question. His researches have been carried out at great expenditure of time and money, in the hope, that, in the light of its results, the rapidly developing discipline of preventive medicine might find a plan of curtailing, in some degree, the number of annual victims to preventible disease.

WHEN THE STUDENT is translating from a foreign language, especially from the classics, the teacher is very apt to measure the quality of the performance by the literalness of the translation. Every preposition, every interjection, every case or tense signification, must find verbal expression in English, no matter at what sacrifice of sense and spirit. But translation is not the same thing as transliteration. The student's aim should not be to get the Greek or Latin words into English, but to convey the sense and spirit of the writer. We are convinced that this is one of the most prominent faults in the classical instruction of the present. And it does not end in the mere use of language. It has a narrowing, cramping influence on the mind, instead of developing that breadth of view and comprehension which ought to come from classical study. It is surprising, too, how great an influence for evil this ultra-literal translation has on the student's English style. We have known numerous instances where the peculiarly Greek and Latin idioms have been quite as numerous in a composition or essay as the English. The result is, naturally enough, a forced, artificial, and awkward style. Our classical teachers, especially those who have the supervision of the younger pupils, cannot be too careful in demanding a translation which shall not neglect the spirit while it interprets the letter of the author.

THE REPORT OF THE SPECIAL COMMITTEE of the American public health association on the disinfection of rags contains a complete summary of all the evidence which has thus far been accumulated, in this country and Europe, in reference to this article of commerce, and the dangers connected with it. The greater part of the report was submitted at the Toronto meeting of the association. A letter from Dr. Sternberg to one of the members of the committee, giving the results of his inves-

tigations abroad, has been appended to the report. In it Dr. Sternberg says he made inspections at Ghent, Brussels, Berlin, and Stettin, and obtained reliable information as to the methods pursued in Hamburg and other German ports from which rags are shipped to this country. He had previously supposed that rags from ports in southern Europe, where cholera was prevalent, were liable to be shipped from any of these ports; but he was assured that this could never occur, on account of the low price of rags as compared with the cost of land transportation. As a matter of fact, rags sent to each shipping-port can only be collected within a limited area, the boundaries of which depend upon cheap transportation facilities by canals, rivers, etc. He regards it as incumbent upon all sanitarians to insist upon the proper protection of all those who are brought by their occupation in contact with old rags. If this is done, the danger will be reduced to a minimum; and if the community is fully protected in the same way as is the case in Germany, there will be no good reason for disinfecting rags in the bale. He considers it as desirable that all old rags should be disinfected by steam, and dried, before being baled. During the prevalence of cholera, all old rags from ports known to be infected, or in direct communication with infected places, should be excluded. He would require all rags shipped from a healthy port during the prevalence of cholera in Europe to be disinfected by steam before being baled for shipment. In the absence of any prevailing epidemic, baled rags should be treated as other merchandise. If any merchandise is dangerous, it should be disinfected, and this can be done most effectually by steam.

THE EPIDEMIC OF SCARLET-FEVER attributed to the milk of a sick cow, to which we referred in a recent number of *Science*, has been still further investigated by Dr. Klein, for the British government. A micrococcus was obtained from the ulcers of the sick cow, which, when inoculated into calves, produced the same lesions as existed in the cow from which they were taken. Dr. Klein has found in the blood of scarlet-fever patients a micrococcus which appears to be identical with that obtained from the cow. He has inoculated and fed mice with the micrococci from these two sources, and the same results have been produced. He has also obtained the same micrococci from the blood of these mice, and cultivated them. The same inoculations have been made

upon calves, with the same results. If these observations are confirmed by further experiments and other experimenters, the micro-organism which has been so long undiscovered, and which causes tens of thousands of deaths annually, may soon be added to the list which now contains that of tuberculosis, typhoid-fever, and a few other diseases.

THE AMERICAN SCHOOL OF CLASSICAL STUDIES AT ATHENS.

THE opportunity which is just now presented to the managers of the American school at Athens to secure an efficient, permanent director, brings the claims of this useful enterprise with fresh strength before the scholars and promoters of learning in America. Dr. Charles Waldstein, the accomplished archeologist, who is a citizen of New York and a former student of Columbia college, but who now holds two important positions at the University of Cambridge, England, as lecturer on archeology and director of the Fitzwilliam museum, has accepted the invitation of the managers to assume the directorship, upon the condition that a permanent endowment shall be secured for the school, sufficient for its legitimate needs, before the 1st of October, 1888, when the appointed year of Professor Merriam of Columbia college will end. A writer in the *London Saturday review* for Sept. 26, 1885, gives an intelligent and highly appreciative account of the work done by the American school, but makes this forcible criticism: "Undoubtedly the weak point of the whole American scheme is the fact that the director goes out for a year only. America can send a succession of good scholars, but she cannot send a succession of men capable of teaching archeology; indeed, a student who remains at Athens longer than the regulation year might easily become more learned in that pursuit than his director. Thus the head of the school cannot instruct his students, but only work with them, and they must pick up their knowledge from books as well as they can."

The American school of classical studies was projected by the Archeological institute of America (of which Prof. Charles Eliot Norton is the president), and was organized under the auspices of some of the leading American colleges. The director of the school was to be chosen from the professors of Greek in these colleges, by a committee appointed by the Archeological institute. The school was opened on the 2d of October, 1882, under Prof. W. W. Goodwin of Harvard university. Its object was to furnish to graduates of American colleges an opportunity to study classi-

cal literature, art, and antiquities in Athens under suitable direction; to prosecute and to aid original research in these subjects; and to co-operate with the home institute, so far as possible, in conducting the exploration and excavation of classic sites. The salary of the director was to be paid by his own college, and no fees were to be charged to the students. The boldness of this enterprise was peculiarly American, for, while the older French and German schools had been maintained for many years by the liberality of the two governments that founded them, the projectors of the American school relied with confidence upon the willingness, and even eagerness, of our intelligent men of wealth to take the place which ancient governments fill in Europe, as patrons of learning.

The American undertaking instantly presented a stimulus in the same direction to English scholars; and within three years we find Dr. Lightfoot, the bishop of Durham, urging his countrymen to emulate our example in establishing a school at Athens. He said at a public meeting in London, in 1885, "It now touches our honor as Englishmen very nearly that this scheme should be carried out without delay. France and Germany have long been in the field. France has her school, and Germany her institute; and even America has forestalled her in this race. That new country, notwithstanding the vast and absorbing interests of the present, notwithstanding the boundless hopes of the future, has been eager to claim her part in the heritage. While all the civilized nations of the world, one after another, are establishing their literary consulates in Athens, shall England alone be unrepresented at this centre of Hellenic culture?"

These words, supported by the earnest appeals of Dr. Hornby, provost of Eton, Prof. R. C. Jebb, and other distinguished scholars, produced the desired effect, and a British school is now established in Athens.

The American school has now nearly completed its fifth year of work, with increased numbers of students and every prospect of increasing usefulness. It has up to this time occupied a hired house, and has been entirely supported by the annual contributions of fourteen colleges, from which the house-rent, the appropriations for the library, and incidental expenses, have been paid; each college, in its turn, sending a professor to Athens as director for one year without expense to the school. With these temporary and imperfect arrangements, much valuable work has been accomplished by the school, which has received cordial recognition both at home and abroad. "Now," as the managers say, "a new era is to begin. We are henceforth to have a home of our

own. The government of Greece has shown such warm interest in our enterprise, that a valuable piece of land on the slope of Mount Lycabettus, containing an acre and a half, has been granted to the school by a royal edict, issued July 25, 1886, and signed by seven ministers of state."

This generosity of the Greek government has already been so well seconded by friends of the school in America, that sufficient funds are already in hand to erect and furnish a suitable home for the school, which will be ready for occupation in October. To place the enterprise in a position to attain the greatest possible usefulness, an endowment of at least a hundred thousand dollars ought to be secured. Plenty of work lies before the school. Prof. Martin L. D'Ooge of the University of Michigan, the director for 1886-87, writes that the French government is not likely to accept the offer, made by the Greek authorities, of the privilege of making excavations at Delphi, and in that event the chance will be offered to the Americans.

We may fitly end this brief account of the American school at Athens with the glowing words of Professor Goodwin himself upon this very subject: "The Archeological society of Athens has disclosed a wealth of ancient temples near Epidaurus, — among others, the beautiful round building erected by Polycletus, and the theatre, also his work; and the same society has opened to the day the foundations and the pavement of the great sanctuary of Eleusis, the home of the Eleusinian mysteries, which offers more problems to architects and archeologists than will soon be answered. Every part of Greece is full of plans for new excavations, which merely need money to be carried out with substantial results. The ruins of Delphi, with their countless buried temples, which peer imploringly from the scanty earth, as if beseeching the traveller to restore them to the light of the sun, lie at this moment waiting only for some power to decide who shall excavate them; and happy will be the scholars who are fortunate enough to be in Greece when the solemn silence of that wonderful valley of Delphi is first broken by the pickaxe and the spade."

JOHN S. WHITE.

LONDON LETTER.

THAT the people of England are at last beginning to realize the immense importance of technical education is evident from two facts, — first, that scarcely a week passes without prominence being given by the press to utterances on the subject by public men; and, second, that pressure is being put on the government to extend such in-

struction. A few days ago Lord Hartington distributed the prizes at the Polytechnic young men's Christian institute, an organization in the west of London which numbers seven thousand students in technical subjects; and his speech, in which he quoted Professor Huxley, was widely circulated and favorably commented upon. During the present week a very influential deputation was received at the education department, which strongly urged the provision of manual training in all elementary schools, as a preparation for technical instruction later. It was pointed out that a very slight modification of existing organizations would enable this to be done at a small expense. The reply of the government, though sympathetic, was to the effect that parliament had not yet pronounced an opinion on the subject.

On the evening of March 16 a very well arranged and largely attended *conversazione* was held at the Central institution of the city and guilds of London, for the advancement of technical education. Demonstrations were given during the evening by members of the staff, notably by Professor Unwin, F.R.S., with the 100-ton testing-machine. The apparatus and methods of instruction employed were on view in the different laboratories, and interesting exhibits, lent for the occasion, were also displayed. Two concerts added to the enjoyment of the fifteen hundred guests; but it was rather unkind to allot, as a ladies' cloak-room, a room on the door of which was inscribed, 'Chemical preparation room.'

Lecturing a few nights ago to a crowded audience at the Royal institution, on 'Mental differences in men and women,' Dr. Romanes remarked that the average woman's brain weighed five ounces less than the average man's, and that the inferiority of women displayed itself in the absence of originality in the higher levels of intellectual work. In powers of acquisition, women stood nearer to men, and indeed often surpassed them at an early age.

On Tuesday, March 15, a most unusual meteorological state of things prevailed in London, which was at the time under the influence of the calm weather between two systems of depression. Snow fell to the depth of a foot or more, — and it did not disappear for more than a week, — and simultaneously a high fog occurred, literally causing midnight at noon and for some hours after, although the lower strata of air were fairly clear, and devoid of mist. In consequence of the unexpected sudden consumption of gas, the supply thereof ran short, and in many places grave inconvenience and danger resulted.

M. Hermite's process of the electrolytic bleach-

ing of cotton cloth, etc., is attracting a great deal of attention from both the scientific and the practical side. A very favorable opinion was lately expressed upon it at the Society of chemical industry. The process consists essentially in electrolyzing a solution of magnesium chloride, thus liberating the active agent of chlorinated lime; and, as it is easy to maintain the solution at constant strength, it is found that the consumption of chlorine is only one-half that on the ordinary system. The fundamental industrial equation of economy shows that the mechanical work represented by 570-horse power spent upon a dynamo-machine will produce the equivalent of ten hundredweight of bleaching-powder ('chloride of lime') per hour, or a 50-horse-power engine would give one ton per day of twenty-four hours.

Since Mr. Castner's paper upon his process for manufacturing sodium and potassium was read at the Franklin institute of Philadelphia (Oct. 12, 1886), several changes have been made in the method of manufacture. These were recently brought before the London section of the Society of chemical industry by Mr. James Maclear. With caustic soda at eleven pounds per ton, the sodium produced costs less than twenty-five cents per pound, the cost of materials and fuel being only seventeen cents. The steel crucibles employed have been used fifty, and probably can be used a hundred and fifty or two hundred times: hence the 'tear and wear' on them amounts to not more than two cents per pound of sodium. Cheap sodium, it need scarcely be mentioned, means cheap aluminium (by Deville's process), which, with sodium at the above price, can probably be produced at four dollars per pound, or one-fourth its present value.

The conditions affecting the distribution of micro-organisms in the atmosphere were the subject of a paper at the Society of arts three nights ago, by Dr. Percy F. Frankland, son of the distinguished chemist. The method of observation was Hesse's, in which a given volume—usually ten litres—of air is slowly drawn through short wide tubes coated internally with a solid layer of sterile gelatine-peptone. The maximum number in the same place observed through the year, occurred early in August. Elevation above ground, and distance from human habitations, decreased the number. In sea-air, for example, at one hundred and twenty miles from land, there was only one organism to ninety-three litres. In considering his paper, the author expressed a decided opinion that it was the chemical side of bacteriology which imperatively demanded attention at present. The chairman, Prof. Burdon Sanderson,

adjourned the discussion for a week, when it will be opened by Dr. Alfred Carpenter.

The government, which was recently approached on the subject, has just agreed to make an annual allowance of eight thousand dollars per year to the youngest of English universities, the Victoria, whose headquarters are at Owens college, Manchester. The success of this application will encourage the promoters of government aid to the university colleges throughout the country, now languishing for want of funds.

The Institution of naval architects, and the scientific ship-building industry generally, have just sustained a severe loss by the death of Mr. William Denny of Dumbarton. Throughout his too brief career, the influence upon him of Mr. William Froude, F.R.S., was very marked. The scientific department which he established in his own yard at Dumbarton, on the Clyde, was the first of its kind in a private ship-building yard, and the façade of its great experimental tank (300 feet by 22 feet, with 9 feet of water) was erected to Mr. Froude's memory. Mr. Denny was the first to use mild steel for the construction of transatlantic steamers, in 1879. His most famous paper probably was that on the difficulties of speed calculation, in 1874-75, and his last was in 1884, on 'Cross-curves of stability.' In 1882 he delivered the 'Watt anniversary lecture' at Greenock, on 'The speed and carrying of screw steamers.'

W.

London, March 26.

GEOGRAPHICAL NOTES.

Asia.

The latest letters of the enterprising Frenchmen MM. Capus and Bonvalot, who are trying to reach India from Samarkand, are of considerable interest. The latest are dated Jan. 13 and Feb. 23, 1887. They started from Samarkand for Bokhara on Sept. 13. Near Samarkand they traversed the extensive plantations of General Korolkof, who has, by irrigation, brought under cultivation an extensive area of barren country on both sides of the Kara Tepe. Over the difficult passes of Takhta-Karacha and Lahore Murda the travellers reached the valley of the Sangardak. All this district is inhabited by the Uzbeks and Tajiks. After a few days they reached the plain of Hissar. This district produces rice in great quantities and of exceptionally good quality. The town is very unhealthy, and in summer the whole population moves to Karatagh. The travellers then descended the unexplored valley of the Kafirnahan to its confluence with the Amu-Darya. In this valley,

which is everywhere covered with an efflorescence of salt, there are many settlements of the Uzbeks, which are situated on the rich alluvial ground at the bends of the river or on its islands. They followed the Amu-Darya, and, after having made some excavations at Termez, crossed it at Chushka Guzar into Afghanistan. Here they were made prisoners, and, after being detained for twenty-five days, sent back across the frontier. They resolved to return to France, but, on learning that caravans starting from Kashgar go sometimes in winter to Ladak or Le, they decided to take this route. They intend to cross the Pamir, starting from Gulcha. After having reached the Kara-Kul, they will follow the river Akbaïtal, and endeavor to reach Kunjut. Though the passage of these deserts — which are at an elevation of from thirteen to sixteen thousand feet — in winter is very difficult, they will at this season avoid being hindered in their progress by the inhabitants.

Africa.

Rev. George Grenfell, the successful explorer of the Kongo basin, has ascended the Kwango in the Baptist missionary steamer Peace, and reached Kikunji Falls, the place where von Mechow, who came from the south, was obliged to turn back. About six miles from the junction of the Kasai with the Kwango he found another large tributary, the Juma, entering the river from the east, which presented so large a volume of water that it was a matter of uncertainty which was the larger stream. Probably this river is identical with the Kuulu of the maps. He ascended the great bend of the Kwango, which comes back to its northerly course at latitude $4^{\circ} 30'$ south. The Kikunji Falls are about three feet high, and, though insurmountable for the Peace, are said by Mr. Grenfell to be no obstacle to communication by canoes and small craft (*Proc. Roy. geogr. soc.*, April, 1887).

The last number of the *Antananarivo annual and Madagascar magazine* (Christmas, 1886) consists, besides a reprint of Mr. A. R. Wallace's chapter on the fauna of Madagascar, mainly of papers on linguistic topics and on Malagasy folklore. M. Grandidier's paper on the channels and lagoons of the east coast of the island is translated, with some interesting remarks by Mr. Sibree appended. Mr. Sibree points out that it would only require about thirty miles of canals to connect all these lagoons, and so create a safe and extensive internal water-way of the greatest commercial value. The Rev. W. Montgomery contributes a paper on the Malagasy game of 'fane-rana,' in many respects resembling chess (*Nature*, March 24).

America.

The field-work of the geological survey of Newfoundland in the year 1886 included a survey of the Bay of Exploits, which was made by James P. Howley. Of late years the services of the survey have been devoted chiefly to blocking off land for agricultural purposes. Most of its geographical work is still in manuscript, and has never been published at all. It includes surveys of Notre Dame, St. George's, and Port a Port bays, surveys of all the principal rivers of the islands, and triangulations of the larger lakes.

Fontana has published a report on his expedition in eastern Patagonia. Soon after his appointment as governor of the territory of Chubut, the Welsh colony in the lower valley of the Chubut River, invited by reports of the fertility and gold-mines of the Andes, organized an expedition for exploring the valleys of the Andes, and offered the leadership to Fontana. The party ascended the river Chubut, which flows through the desolate plains of eastern Patagonia. As its upper course runs almost parallel with the Andes, they ascended the Charmate, one of its tributaries, and then struck west. After a ride of a few days they reached the fertile valleys of the Andes, and came to the Rio Corcovado, which runs west to the Pacific Ocean. As the confluence of the Chubut and Charmate is only 1,800 feet above sea-level, and the point where they reached the valley of the Corcovado 1,600 feet, it is evident that the Andes do not form a continuous chain of mountains, but that they are intersected by deep valleys. Farther south the Strait of Magellan, the Rio Santa Cruz, Rio de los Huemules, and Rio Aysen indicate valleys that cut across the whole width of the mountains. As the land was so heavily timbered as to hinder the progress of the party, they returned to the Charmate. From here they went south, and passed the watershed between the Senguel and the Chubut. After having reached the Senguel, they ascended it, and it is here that Fontana made his most important discovery. In latitude 45° south, close to the source of the Rio Aysen, he found a large lake, through which the Senguel flows. He was prevented from following its upper course, as the woods were too dense. He therefore returned, following the Senguel, which flows through a swampy valley, bordered on its southern side by desolate hills, on its northern side by volcanic mountains, the colors of which are as manifold and glaring as those of the Painted Desert. This expedition will probably lead to the establishment of a colony on the Corcovado, or Lake Fontana, as the newly discovered lake has been called, by the enterprising Welsh

colony of the lower Chubut (*Deutsche geogr. Blätt.*, 1887, No. 1).

Australasia.

Admiral von Schleinitz, governor of the German possessions in New Guinea, is continuing his explorations on the coasts of New Guinea and the neighboring islands. In October, 1886, he explored the coasts of Huon Gulf, where he found several navigable rivers. The coast consists of archaic and metamorphic rocks. In November the coast from Iris Point to Cape della Torre was surveyed. The results of these observations have been published in the *Nachrichten aus Kaiser-Wilhelm-Land und dem Bismarck Archipel*, 1887, Nos. 1 and 2.

Mr. Vogan, the curator of the Auckland museum, intends to cross south-eastern New Guinea from Freshwater Bay to Huon Gulf as soon as the rainy season is over (*Proc. Roy. geogr. soc.*, April, 1887).

Oceans.

The methods and results of Lieut. J. E. Pillsbury's researches on deep-sea currents in the Straits of Florida (Appendix 14, *Coast and geod. surv. report for 1885*) are very interesting. They were carried out on the steamer Blake, at five stations between Gun Key and Cape Florida. By an ingenious arrangement, Pillsbury contrived to anchor at a depth of almost five hundred fathoms, and was thus enabled to measure the currents by a revolving meter. For a description of the apparatus we refer to the original paper. As the time allotted to the work was not long enough to make exhaustive researches, and the state of the weather was frequently too bad for anchoring in deep water, the observations are rather irregular. The results are very valuable, and we are glad to learn that the researches will be continued. The strength of the current is influenced by the tides; and the principal maximum, which occurs about four hours before the meridian passage of the moon, is very distinct. The fluctuations of the curve are so irregular, however, that it is hardly possible to plot the observations for determining the axis of the current and its strength in various depths. It appears that the greatest intensity of the surface current is near the west shore, while the current at a depth of a hundred and thirty fathoms is strongest in the middle of the strait.

Lieut. A. de Gueydon has constructed an apparatus similar to that used by Lieutenant Pillsbury, but far more complicated, which he has tested by measuring the currents of the Bosphorus. It is described in the *Revue maritime et coloniale*, November, 1886. The results of his observations

confirm those obtained by Makarof (*vide Science*, ix. 301). He found during calms and prevailing north-easterly winds a surface current of ninety feet depth setting from the Black Sea to the Sea of Marmora. At Constantinople a smaller arm branches off, which sweeps along the south side of the Golden Horn, and forms an eddy, returning on the north side, and again reaching the Bosphorus at Top Hane. This current reaches to the bottom. Sudden changes in its velocity are very frequent. Under the main surface current, Gueydon found the well-known undercurrent running from the Sea of Marmora to the Black Sea.

In the *Annalen der Hydrographie*, 1887, No. 3, G. Karsten discusses the observations on the ice of the harbor of Kiel, the most important station of the German marine in the Baltic. During the thirty-eight years over which the observations extend, the harbor was frozen up seventeen times, the mean duration of the ice-sheet being thirty-four days; the maximum, seventy-one days. The ice forms most frequently in January. In the beginning of winter the warm concentrated water of the German Ocean, which enters the Baltic, delays the formation of ice, though the temperature of the air may be low. As soon as an easterly wind sets in and carries less concentrated cold water of the Baltic into the bay, an ice-sheet is formed.

General.

The publication of the *Zeitschrift für wissenschaftliche Geographie*, which was discontinued some time ago, has been resumed by Dr. J. I. Kettler. The first number for 1887 contains, among other papers, an article by O. Krümmel on surface temperatures of the ocean, and one by H. Reiter on the Antarctic question.

NOTES AND NEWS.

THE chemist of the Massachusetts state board of health has recently analyzed a large number of so-called temperance-drinks, and has found that all of them contain alcohol, one of them containing as much as 44.3 per cent. Several of them contain more than 40 per cent, and a very large proportion more than 20 per cent. One of these is said by its manufacturer to be "a purely vegetable extract, stimulus to the body without intoxicating." "Inebriates struggling to reform will find its tonic and sustaining influence on the nervous system a great help to their efforts." This preparation was found to contain 41.6 per cent of alcohol.

— The *Boston Medical and surgical journal* contains the history of six cases of poisoning from the arsenical wall-paper of a single room, extend-

ing over a period of several years. The removal of the paper was followed by perfect immunity to those who subsequently occupied the room.

— A. H. Smythe, Columbus, O., announces an edition of the 'Preliminary report on petroleum and inflammable gas in Ohio, by Prof. Edward Orton, state geologist. The first edition was issued and distributed by the legislature of Ohio, and no copies were placed on sale.

— Professor Rhys-Davids is at work upon a selection of sacred Pali texts which he expects to publish shortly.

— The English Goethe society now numbers two hundred and fifty members, and has undertaken the publication of its Transactions.

— The *Athenaeum* finds, that, according to the most recent reports, education in the north-western provinces of India amongst males has received a slight check, the number of pupils at the schools having decreased from 249,355 to 244,146. On the other hand, female pupils increased from 10,746 to 11,187. Altogether, 94 boys and 4 girls per thousand of the population of school-going age are under instruction. It is a sign of the very satisfactory progress now being made by Mohammedans in educational matters, that, in proportion to their numbers, they contribute four times as many pupils to the primary schools, and nearly twice as many to the secondary schools, as Hindus.

— No school and college text-books are as handsomely gotten up as those issued by Macmillan & Co., and we are glad that they offer the product of their press to students of mathematics as well as to students of literature. We have recently received their 'Text-book of Euclid's elements, books i and ii,' by Messrs. Hall and Stevens. The little book is handsomely printed, the original riders and deductions clear and useful, and the use of type in the various demonstrations very judicious. We like especially the way in which the given lines and lines of construction are distinguished in the diagrams. It is a great improvement upon the old-fashioned use of the dotted line.

— A performance of the *Oedipus Tyrannus* is to be given at Cambridge, England, in November next.

— The Rede lecturer at the University of Cambridge for the coming year is J. R. Seeley, regius professor of modern history.

— There were no fewer than 3,635 matriculated students at Edinburgh university last year, which is the largest number on record. Of these, 1,915 were students of medicine; 1,122, of arts; 490,

of law; and 108, of divinity. Of the medical students, only forty per cent are Scotchmen.

— St. Andrews university has conferred a large number of honorary degrees recently. Dr. Philip Schaff of the Union theological seminary, New York City, was among those who received the degree of D.D.

— We have received the biennial report of the State school of mines at Golden, Col. It is well gotten up, and contains as an appendix valuable papers by members of the faculty, as follows: 'Notes on iron prospects in northern Colorado,' Regis Chauvenet; 'Mineral resources of Boulder county,' P. H. van Diest; 'Geology of the Aspen mining district,' Arthur Lakes; 'The present mining-law chaos,' Magnus C. Ihlseng; 'Mining notes from Eagle county,' George C. Tilden.

— The 'Elements of English,' by G. H. Reker (Chicago, Interstate publishing co.), is an introduction to English grammar for the use of schools. It is very elementary in character, and consists of a series of lessons treating of the parts of speech and their uses, of the simple sentence in its various forms, fully illustrated by practical exercises composed of common words in daily use, so that pupils are gradually, and almost unconsciously, led on to a knowledge of the correct use of their own language.

— Mr. A. M. Ogilvie recently presented before the Aristotelian society an interesting paper on Lotze's metaphysics, of which the following is an abstract. The most significant aspect of Lotze's teaching is its many-sidedness. An eminent man of science as well as a philosopher, he also had a most delicate appreciation of the aesthetic and moral standards of value which govern human life. He sought in philosophy an answer to the complex of questions arising out of life as a whole, and not merely an hypothesis satisfying the requirements of physical science. No one felt more strongly that only in actual experience have men a living evidence of reality, but he showed that in experience the significance lies in those ideal forms in which it manifests itself to reason. In his ultimate analysis of our experience of nature, Lotze arrived at a conception of a universal absolute working by fixed laws, revealed to us in experience, towards an ideal end. Mental phenomena in the same final analysis give evidence of the existence of finite spirits, not independent of the Infinite Spirit, which in the last resort the aesthetic and moral experience of man realizes not merely as a bare absolute, but as a living personal Deity.

— Sir William Vernon Harcourt has resigned

the professorship of international law at Cambridge.

— Dr. Hall's lectures on education at the Johns Hopkins university are given once weekly before a class of twenty-nine students.

— In the current number of *Scribner's magazine* are two articles that may fairly be classed as educational. The first is by Prof. W. B. Scott of Princeton, on 'American elephant myths,' in which he discusses in an extremely interesting manner the evidence, in tradition and inscription, of the existence of elephants in America in ancient times, and recounts many of the popular fallacies in regard to them. Prof. A. S. Hill of Harvard closes the number with a short but vigorous article on 'English in our colleges,' in which he discusses the question of what branches of English instruction are of greatest importance to college students, and pays particular attention to the methods of teaching English composition.

— Archdeacon Farrar writes from East Africa that the whole district of Magila, with its hundreds of villages and thousands of people, has recently been saved an invasion of small-pox, which has prevailed in surrounding districts, by general vaccination. He adds that this has commended medical science to the people, and they come in numbers to be vaccinated.

— Dr. Gustav Berndt has prepared a monograph on the Swiss Foehn, entitled "Der Foehn, Ein Beitrag zur orographischen Meteorologie und comparativen Klimatologie" (Göttingen, 1886). This is the most considerable work of the kind; and, although devoted especially to the phenomena noted in Switzerland, it has also an introductory chapter giving the history of the theories proposed to account for this wind, and a final chapter describing analogous winds elsewhere. The latter does not include any on this continent, if Greenland be excepted.

— Dr. Davenport, state analyst of Massachusetts, has examined twenty advertised cures for the opium-habit, and found that all but one contained opium. This one was called 'double chloride of gold,' but contained no trace of gold.

— Superintendent Barringer's last report shows that the number of children in Newark (N.J.) of school age — between five and eighteen — is 42,263, an increase over the previous year of 454. 41 school-buildings are in use; and 380 teachers, of whom only 29 are males, are employed. The total enrolment was 24,894, and the average per cent of attendance, 89.2.

— Lord Gifford, one of the judges of the Edinburgh court of session, who died recently, has be-

queathed £80,000 to found lectureships on natural theology at the four Scottish universities. Edinburgh gets £25,000; Glasgow and Aberdeen, £20,000 each; and St. Andrews, £15,000.

— The *Athenaeum* states that the report on education in the Bombay presidency for the year 1885-86, recently issued, is of unusual interest as dealing with the important subjects of the transfer of schools to local bodies, and the development of technical education. With regard to the general progress of education, the year's statistics are the most favorable ever presented to the government of Bombay. At the end of the year there were 460,987 children in the schools connected with the education department, the largest number previously recorded having been 438,416. One specially favorable feature of the report is the evidence it supplies of the progress of female education, the number of girl pupils at the schools having increased from 42,230 to 45,037. The government consider that the report affords ample proof of the capacity of private enterprise in respect of the management of higher aided schools.

— The *Medical and surgical reporter* records the observations of Gellé in the relation between sensibility of the tympanum and the direction from which sound comes. When a sound strikes the ear, it is referred to that part of the horizon towards which the organ is directed at the moment of the most intense sensation. The knowledge of the fact that the sound-producing body is outside us, and the notion of the direction in which it lies, are thus acquired at one and the same time. How is the result obtained? As a result of experiments on two patients in Charcot's wards, Gellé concludes that the sensibility of the tympanum plays an important part in the effort to perceive the direction of sound; that the tympanum is sensitive to the vibrating sound-waves, and this sensibility gives us the notion of exteriority and of the direction of the sound. The patients were suffering with general anaesthesia, and it was found that the drum-membrane might be touched and pricked without the patient's having the least sensation of pain or of contact. Although the tick of a watch could be heard with either ear, the patients were unable to say on which side it was placed.

— Mr. George J. Romanes has communicated to the Linnean society the results of some experiments made by him to test the sense of smell in dogs. He finds that not only the feet, but the whole body, of a man exhales a peculiar odor which a dog can recognize as that of his master amidst a crowd of other persons; that the individual quality of this odor can be recognized at great

distances to windward, or in calm weather at great distances in any direction; and that even powerful perfume may not overcome this odor. Yet a single sheet of brown paper, when stepped upon instead of the ground, and afterward removed, was sufficient to prevent his dog from following his trail.

— Some of the features of shorthand-writing, synchronous-multiplex telegraphy, and type-writing, are combined in a system of steno-telegraphy invented by M. G. A. Cassagnes of Paris. In recent experiments over a wire running from Paris to Orleans and back, messages were sent at the rate of two hundred words a minute, that being the highest speed attainable by a nimble-fingered operator. By means of an automatic transmitting apparatus, using a strip of paper previously perforated, as in some of the systems of telegraphy already in vogue, seventeen thousand words per hour were sent over a line 650 kilometres in length, the messages being automatically printed by the receiving instrument.

— The general assembly of German teachers will be held this year at Gotha on May 31 and June 1 and 2.

— The German teachers of modern languages, having doubtless seen how successfully a similar scheme is working in France, asked the chancellor to establish travelling scholarships for advanced students of modern languages. Bismarck replied that the matter was not one for the imperial government to attend to, but should be brought before the educational authorities of the various German states.

— The gymnasial curriculum in Hungary, having proved faulty, is to be altered. A commission appointed to devise means of improvement recommend that Hungarian literature, at present confined to the highest class, be taught in the two highest classes; the teaching of geography, hitherto restricted to the lowest classes, to be carried higher up and preceded by a course of political geography; German to be taught less theoretically, and more with a view to acquiring the language practically. The teachers in the gymnasias are recommended to raise the standard of their teaching, and not to allow the pupils to go into a higher class so easily as at present. This evil prevails chiefly in the confessional schools, where the teachers draw part of their salary from the school fees. The government is recommended, in the report, to alter this system of payment.

— A dinner in behalf of the American school of classical studies at Athens was given April 14 at the Hotel Brunswick. The object of this dinner

was to afford to the founders of the school an opportunity of bringing its purposes and methods conspicuously before the public, and to quicken the interest of many who now know of it only by repute.

— The excursion committee of the Appalachian mountain club present the following preliminary announcement, subject to possible changes: April 30, Monk's Hill, Kingston; May 14, May walk, Wissahissick Pond; May 28-30, Mount Grace (Warwick), and Greenfield, Mass.; June 17 and 18, Monadnock and Dublin, N.H.; July 1-9, Crawford House; Aug. 20-30, Ktaadn.

— The following schedule gives the location of the vessels in the coast-survey service and a brief summary of their work: the steamer *Gedney* (F. H. Crosby commanding) and the schooner *Eagre* (C. P. Perkins commanding) have begun work in Long Island Sound, and will make an extended and systematic series of current observations in the waters of the sound; the steamer *Bache*, in command of Lieut. J. F. Moser, is at work on the coast of Florida; the *Endeavor*, in charge of Lieut. D. D. V. Stuart, is now engaged on current observations off the coast of Louisiana; the *Blake*, in command of Lieut. J. E. Pillsbury, U.S.N., is taking deep-sea soundings in the Gulf Stream; the *Patterson* is now at Mare Island navy-yard, California, and will probably start for the working-grounds in south-east Alaska, about the first of May, in command of Lieut.-Com. Charles M. Thomas, who relieves Lieut.-Com. A. S. Snow; the steamer *McArthur* is at Oakland, Cal., in command of Lieut. J. C. Burnett, preparing for work on the coast of Oregon and Washington Territory; the schooner *Earnest*, in command of Lieut. Charles T. Forse, is fitting out for work in Puget Sound, Washington Territory.

— U.S. Consul Goodwin of Annaberg, Germany, in a recent report on oyster-culture in Germany, states that the experiments of transporting and breeding American oysters have proved quite unsuccessful in all cases, and entirely so in most instances. Professor Möbius of the University of Kiel, who has made many experiments, expresses the opinion that American oysters would never spawn in German waters. Mr. Fedenser, a citizen of Schleswig, who takes great interest in the subject of oyster-culture, however, has not abandoned the attempt. He is of the opinion that American oysters can be successfully raised in Germany, and he has planted two hundred and fifty barrels of selected breed oysters in the vicinity of Schleimünde.

— Nebraska has just come into the line of states distinguished by having state boards of health.

—It is intended to hold an international congress on cremation in September of the present year in Milan.

—Mr. Thomas Wilson of Washington has just presented to the national museum a fine collection of old coins, chiefly Roman, which will shortly be placed on exhibition. In the collection is a Swedish daler coined in 1736. It is an oblong plate of copper, about four inches long and three inches wide, with four circular die-marks stamped upon it. The coin weighs about a pound and a half. The collection of Roman coins starts with a simple lump of bronze, the *aes rude*, which served as a medium of exchange among the Romans seven hundred years before the Christian era. This was obtained at Palustrina. There are numerous rudely stamped coins of a later day, consular coins of the republic, and later specimens of coins of imperial Rome. These are stamped with the heads or busts of the reigning emperor. The coins are of gold, silver, and bronze. A curious specimen of the collection is a counterfeit coin made by some Roman rogue. It is a copper coin washed with silver.

—It is said that there were in Norway, in 1879, 1,630 cases of leprosy, some five hundred less than in 1856; so that the disease appears to be on the decline. By a recent law the government is empowered to send all lepers to the hospitals, but this power has not yet been exercised.

—The address of Prof. Andrew F. West of Princeton college, on 'How to improve our classical training,' delivered last fall in Philadelphia, has been printed in pamphlet form in response to the request of a number of classical teachers.

—Belgium's recent educational changes show at least one decided departure from German practice. The final examinations of the gymnasia have been abolished, and a matriculation examination at the university substituted for them.

—Professor Kirchhoff's abridged grammar of Volapük, the new universal language, has been adapted to the use of English-speaking people by Karl Dornbusch. This language has been formed after twenty years' laborious research by M. Schleyer of Constance. He has named it Volapük from *pük* ('language') and *vol* ('universe'). It has no artificial genders, a single conjugation, and no irregular verbs. The roots of its words have been borrowed from all the languages of Europe. The adjective, verb, and adverb are regularly formed from the substantive, and have invariably the same termination.

—One of the most important collections of oriental manuscripts ever brought to Europe is the

collection which belonged until recently to King Theebaw of Burma, which had been handed down to him as an heirloom by his ancestors or predecessors, and which has now been placed, probably for many centuries to come, on the shelves of the library of the India office in London.

—Lectures on geography are now being delivered at Cambridge university by gentlemen appointed by the Royal geographical society. The university lecturer on that subject assumes his office in 1888, and the contribution of the university toward his salary is only fifty pounds.

—Mr. Gladstone has contributed to the April number of the *English historical review* an article on the last part of the 'Greville memoirs,' which will be of documentary interest for the history of the years 1852 to 1860.

—Prof. William G. Peck of the chair of mathematics and astronomy in Columbia college, whose excellent series of mathematical text-books are in such general use, has recently added to his list a little work on 'Determinants' (A. S. Barnes & Co., New York). The book gives in forty-seven well-printed pages just such an easy introduction to the subject as the beginner wishes to have. The examples are abundant, and the text clear and accurate.

—The *Central-Organ für die Interessen des Realschulwesens* prints on its titlepage, "Die Realschule ist die Schule der Zukunft, weil sie die deutsche Schule ist." The same journal has for its motto,

"Der Schule zu Ehren
Die Freunde vermehren,
Die Zweifler belehren,
Die Gegner bekehren
Ist unser Begehren."

—Prof. Friedrich Koldewey is editing a work of great educational interest, entitled 'Monumenta Germaniae pedagogica.' The first volume has already appeared: it contains the 'Braunschweigischen schulordnungen' from the earliest times until 1828.

—Prof. S. S. Laurie, who occupies the chair of pedagogics at the University of Edinburgh, is about to receive the degree of LL.D. from St. Andrews university.

—Dr. Gobat, the head of the education department of Switzerland, is about to introduce some radical reforms. He criticises the present code as having no sound psychological basis. He says that it makes the development of the mind conform to it, instead of itself conforming to the development of the mind. He finds that the reason the classics are losing interest is that they are poorly taught.

— Much progress is being made in Scotland toward the development of a university extension scheme similar to that described in a recent number of *Science* by Mr. Oscar Browning.

— On account of failing health, Professor Tyndall has resigned his position at the Royal institution.

— The article on the French lycée, which appeared in this journal for Feb. 18, was, by an oversight, not credited to the *Canada educational monthly*, as it should have been.

LETTERS TO THE EDITOR.

*.*The attention of scientific men is called to the advantages of the correspondence columns of SCIENCE for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The rudimentary metacarpals of bison.

IN *Science* for Feb. 18 Dr. D. D. Slade notes the fact that the skeleton of aurochs in the Museum of comparative zoölogy has rudiments of the second metacarpals, while the rudimentary fifth metacarpals are wanting. Dr. Slade will, I trust, pardon me for saying that the deduction he would make from this fact is not quite clear to me. If he considers it an individual peculiarity, I heartily agree with him; but, if he concludes from the evidence presented by this one skeleton that the arrangement of the rudimentary metacarpals in *Bison bonasus* differs from that of *Bison americanus*, I desire to protest most emphatically against any such inference.

Just now, by the efforts of Mr. Hornaday, the U. S. national museum has provided itself with a goodly number of skeletons of *Bison americanus*. Examination of four or five of these shows that in every case rudiments of the second and fifth metacarpals are present, the second being always the smaller of the two pairs. As these are all *in situ*, there can be no mistake in the matter. Our mounted skeleton of *Bison americanus* has only the fifth metacarpal present, but this is because the others have (or at least one of them has) been lost. There is a well-defined articular facet present for the second right metacarpal, but none for the left, although this may none the less once have been present.

The skeleton of aurochs in the national museum has, as Dr. Slade notices, the second and fifth metacarpals present. That, as now mounted, the inner metacarpal on one leg is larger than the outer, proves nothing, as a transposition may readily have been made by the preparator; and no one knows better than the writer how easily such a mistake may be made.

Until a far greater number of skeletons of aurochs have been examined, it would seem the safer course to assume that *Bison bonasus*, in the matter of its metacarpals, makes no departure from the usual order of things found in the Bovinae, and that the Cambridge specimen is merely a case of individual variation.

FREDERIC A. LUCAS.

Washington, D.C., April 10.

The Bellville meteor.

Messrs. A. S. Barnes & Co., publishers of school text-books, have just received the following letter, which is copied *verbatim et literatim*, and published for the public good:—

"April 1 1887

"Bellville ohio

"Gents sir to you

We read & hear a great deal of Meteors what they are i went To see one that fell last fall In november i saw it the papers That it is found hundreds of People went to see it is a curiosty Thair is no print yet discribed Its facts yet as when you see it With the naket eye that some Astronomy aught to have it For the benifit for his books It is a curious stone it is the oddes Shaped stone that ever was by man Or all that i talked with that seen it i asked Mr Phiel how Far him & his son was from it When it fell he told me about 4 rods he says it made The earth shake and a Trementous smel of sulpher It shocked him he went to Worke and dug it out and Took it town it raised the Accitement a greate many people Told me that thay would paid him 50 cts for to see but he left it Public for all to see it some said he aught to travil with It and put on exbition but He says that dont suit for he haint got gab enough for That business that will do some One ells he says if he can find out .P. T. Barnums address he Is going to rite to him and Try to sell it to him and Take it with his show for he can make money with it i asked him what he would Take for it he said he might take between 2 or 3 hundred dollars Mr Barns That would suit you in your Great store if you Gents would Have that meteors in your store Thair would thousands of people Would stop and see it and Pay 25 or 50 cts to se it i Must clos for it is almost Train time for i going to Kanes if you want to rite about the meteor or get some one ells Address

A. B. Phiel,

Bellville Richland
County ohio

"For he will give the full Particulars of it

"Yours Truly from
WM. H. BEAM."

A sensitive wind-vane.

The importance of the sensitive wind-vane question may justify still further trespass upon the space which you allot to correspondence. I am obliged to Mr. Curtis for calling my attention to Mr. Osborne's sensitive vane, as I did not know of it before.

On reading Mr. Osborne's paper, however, I find that his plan was essentially different from mine, in that he applied a liquid damper to the registering-apparatus, and not to the vane itself. In my opinion, there is a decided advantage in controlling the motion of the vane. If it be allowed an unrestricted motion, as is generally the case at present, the influence of its false movements and positions must be felt in some degree by the registering-apparatus, even when that is damped as suggested by Mr. Osborne. The direct damping of the vane will be cheaper and less complicated. As to the length of the vane, I believe that a vane controlled in this way need not be over five feet in length. A vane is often subjected to severe vertical strains, and it should be proportioned so as to endure these without danger. Mr. H. Helm Clayton seems to have entirely misunderstood the question under considera-

tion, which concerns the vane itself, and not the registration of its movements; and in justice to the signal office it ought to be said that a method of registration precisely similar to Dr. Draper's has been in use for many years. Indeed, it is through the study of the records made by this method that the imperfections of the vane are made to appear.

T. C. M.

Terre Haute, April 11.

The power of a voter.

In the general election of 1884 the total number of votes cast in the country was 10,048,061. The number of senators is 76, and the number of representatives is 325. With these numbers, and the total vote of each state in this election, the following table has been computed, in which the figures of the columns give the relative power of votes in the different states:—

	Senatorial power.	Representa- tive power.	Presidential power.
Alabama.....	86	52	65
Arkansas.....	105	40	56
California.....	68	31	41
Colorado.....	199	15	45
Connecticut.....	96	29	44
Delaware.....	439	33	100
Florida.....	221	33	67
Georgia.....	92	70	84
Illinois.....	20	30	33
Indiana.....	27	26	30
Iowa.....	35	29	35
Kansas.....	50	26	34
Kentucky.....	48	40	47
Louisiana.....	121	55	73
Maine.....	102	31	46
Maryland.....	71	32	43
Massachusetts.....	44	40	46
Michigan.....	33	27	32
Minnesota.....	70	26	37
Mississippi.....	110	58	75
Missouri.....	30	32	36
Nebraska.....	98	22	37
Nevada.....	1,033	78	234
New Hampshire.....	156	24	47
New Jersey.....	51	27	34
New York.....	11	29	31
North Carolina.....	49	34	41
Ohio.....	17	27	29
Oregon.....	251	19	57
Pennsylvania.....	15	30	32
Rhode Island.....	403	61	122
South Carolina.....	144	76	98
Tennessee.....	51	38	46
Texas.....	41	34	40
Vermont.....	223	34	67
Virginia.....	46	35	42
West Virginia.....	100	30	45
Wisconsin.....	41	28	34

In many of the states the conditions are such that a full vote is rarely polled. The smallest percentage of voters to males over twenty-one years was in Rhode Island, where it was less than 43 per cent. In Massachusetts and Mississippi the percentage was about 60. In Florida it was more than 90 per cent. Notwithstanding this defect, the table shows very well how political power is distributed among the voters with respect to the legislative and executive branches of the general government. It will be seen that the distribution of this power is much more uniform in the house of representatives, as was intended; and this fact will evidently be a source of power to this house in its conflicts with the other branch of

the legislature. On the other hand, the difference of the senatorial power of voters in the states has become very marked. Thus a single voter in the state of Nevada has as much senatorial power as 91 voters in New York; and a voter in Delaware, 39 times as much as one in New York, and 9 times as much as one in Kentucky. The New England states have more than 9 times the power of New York. In addition to this, in some of the states the senators are elected by a minority of the voters. Where political power is so unequally divided, the respect for the legislative body will depend largely on its wisdom, and the fairness of its conduct towards the whole country. But it is doubtful whether such a condition is permanent.

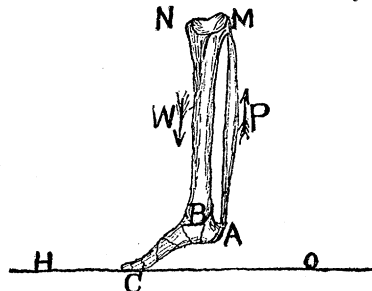
ASAPH HALL.

Washington, April 4.

On tiptoe.

Allow me to say a few final words. The *fulcrum* of a lever is that axis of rotation with reference to which an equation of moments, *consistent with the principle of work*, can be stated. It is my belief that the ankle is the fulcrum of the foot under the circumstances of the problem before us.

How can Professor LeConte's equation be correct as it stands, $P \times CA = W \times CB + P \times CB$, unless the traverse of P be the distance 'virtually' moved



over by the point A of his figure? I claim to have proved that the traverse of P is *not* that distance, but that the arm of P is BA , if the arm of W be CB . If the toe *must* be the fulcrum, a proper equation of moments may be stated by regarding the case as of the third order, with power 'virtually' applied at a distance from toe equal to the distance between heel and ankle. On this view, a foot might be constructed which could be regarded as of the second order, by putting ankle nearer to toe than to heel, or an indeterminate case could occur if ankle were midway between toe and heel. Why not proceed as in the case of the Roberval balance, for instance, by tracing the pressures, produced by bodies applied to the system, to the axes of rotation where such pressures become effective as 'power' and 'resistance'?

Finally, I regard the case under discussion as of the first order, because, first, no proper equation of moments seems possible with power at heel and fulcrum at toe; secondly, a 'virtual' axis must be assumed with power at ankle and fulcrum at toe; thirdly, with power at heel and fulcrum at ankle, the conditions are as usual, except that the mutual tendency of the earth and the 'weight' to approach each other—which tendency produces the 'resistance'—is exerted by the earth at the end of the lever and by the weight at the fulcrum, instead of *vice versa*.

F. C. VAN DYCK.

New Brunswick, N.J., April 9.

SCIENCE.—SUPPLEMENT.

FRIDAY, APRIL 15, 1887.

WHAT INDUSTRY, IF ANY, CAN PROFITABLY BE INTRODUCED INTO COUNTRY SCHOOLS?

IF the question proposed for this symposium is to be taken literally, I should answer, none.

Industry, as such, has, in my judgment, no place in the public schools, though industriousness is always in order there. The prime object of our school system is education; and it cannot be to any considerable extent diverted from that end without injury to the schools themselves and to the community at large. Indeed, it would scarcely be possible to do a greater wrong to the major part of our public-school children than by taking any appreciable share of the little time they have for the development and training of their intellectual powers, for the purpose of applying it to the mere means of bread-winning or money-making.

But while I thus hold strongly to the strictly educational character of school-work, I believe that the courses of study in the schools of New England have been, and, though in a diminishing degree, still are, incomplete, and inadequate to the demands of a full and symmetrical education. I believe that these deficiencies have induced a one-sided development of mind and character; have led to the setting-up of false standards of what is admirable and desirable in life; have caused to be magnified glibness of speech, force of declamation, readiness in recitation, and retentiveness of memory, at the expense of far more useful faculties, qualities, or habits, namely, soundness of judgment, clearness of perception, the habit of observation, the creative instinct, the executive faculty.

Briefly speaking, my project of reform, in schools for boys, would be as follows: carry the best approved methods of the kindergarten upward through the primary grades, as far as the means and resources of each school, for itself, will allow; introduce more and more the study of form, color, texture, structure, and organization, by means of natural objects in the hands of pupils and teachers, stimulating and encouraging the pupils, more and more as their faculties are developed, to make observations for themselves at their play or at their work, and to bring the results back to the school-room, for comparison, for criticism, for discussion; at the age of twelve, or thereabouts, introduce semi-weekly

exercises with tools, preferably wood-working tools, and in clay-modelling, for the cultivation of the sense of form, for the training of the eye and hand, and for gaining the power to give material shape to conceptions of the mind; at fourteen years of age, or thereabouts, introduce exercises in metal-working, and require every boy who passes through one of the high schools of the state to become a good mechanic, not at all for the sake of his practising a mechanical avocation, but to make him a better-equipped, more capable, and more useful *man*.

All this could not be done at once. The system would have to be introduced gradually and tentatively. Probably the more natural order would be that the system should extend from the higher schools downward, and from the city schools outward. Much would be learned in the course of the gradual development of such a system; and the best conceived programme would doubtless require considerable modifications, as the result of experience.

In the case of girls, somewhat different exercises should be prescribed. They should, of course, share in the extension of kindergarten methods and objective science-teaching. Of all other exercises, sewing and cooking should have preference. Clay-modelling and paper and paste-board cutting might advantageously replace much of the wood-working required of boys; but it is not at all certain that girls may not advantageously be taught simple carpentry and cabinet-work. The last-named exercises have been introduced with great success into the normal schools at Salem and Bridgewater, Mass., where the young women readily acquire the power of making much of the simple apparatus required for teaching elementary physics and mechanics.

FRANCIS A. WALKER.

It is doubtful if any industrial feature can be profitably introduced into country schools at the present time.

1. Industrial education is very costly. Under the apprenticeship system, seven of the best years of the life of the youth were given in exchange for the skill that might be imparted, by the master-workman, in a single trade. Still the training of the apprentice was very unscientific. Competent and experienced teachers declare that two weeks of systematic instruction in a thoroughly equipped,

well-conducted manual-training school produces as great a degree of dexterity as two years' apprenticeship under the adverse conditions which prevail in the typical trade-shop. The institution that affords such scientific instruction is necessarily expensive. The Chicago manual-training school received an endowment fund of one hundred thousand dollars; but the tuition-fee therein is two hundred and forty dollars, for the course of three years, and yet the institution is not self-sustaining.

2. The necessity for industrial features is far less imperative in country than in city schools. The country boy learns, very early in life, to do a host of things by doing them. He almost invariably finds his way to a shop containing the typical hand-tools, and learns to use them; and through such use his eyes, his hands, and his mind are trained. Ruskin expresses this idea in a terse sentence: "Let the youth once learn to take a straight shaving off a plank, or draw a fine curve without faltering, or lay a brick level in its mortar, and he has learned a multitude of other matters which no lips of man could ever teach him." Every exercise of farm-work in which the youth engages, develops the observation and renders the judgment more accurate. A rainy day in the shop, with the saw, the hammer, the plane, the chisel, and the square, is better than a week of the city boy's school. The experience of the country boy in field, forest, and shop, is the most important factor in his education. It is to these industrial features of his training that he owes his undoubted superiority to the city youth. Too much prominence cannot be given the fact that it is in the country that the race is regenerated. Rousseau's remark, "Cities are the graves that swallow up the human species," is worthy the careful consideration of educationists. The founding of manual-training schools in cities is an effort to give to city children that knowledge of things which is obtained by country children out of school.

It is, hence, impracticable, for the time being, because of its great cost, to add industrial training to the curriculum of the country schools; and it is unnecessary to do so, since a thousand *things* are learned for nothing by the country boy, through the daily exercises of labor and play, which can be mastered by the city youth only in special schools established and conducted at large cost.

CHARLES H. HAM.

The meaning and application of the term 'school education' is broadening year by year; not in the sense of increasing the number of the subjects of

knowledge for the young people to study, but in discriminating with a view to lessening them, thereby providing the means for a better, more natural growth of the mental and physical powers. The limit of this abuse of the privileges of school, by compelling an excessive use of the brain, we believe is reached; and the best teachers all over the state and country are seeking earnestly for a remedy. Just now attention is being largely turned toward industrial or manual training; and notwithstanding one of the leading papers in the country says editorially, "Industrial education should be kept out of the ordinary common school, these cannot have any further branches," there is wisdom in the movement.

Let us see. One great object in introducing manual training into the schools is to reduce the number of the subjects of daily study, of a purely intellectual character. Some of these are known to be of doubtful utility. Drop them out and give them occupation, just what they need, and this is abundantly supplied by a systematic course in manual training.

Before the child has entered school at all, it has learned to use to the best advantage the eyes in seeing, the ears in hearing, and the hands in manipulating. Vast stores of knowledge have been acquired. But once in the school-room, and these sources of education are cut off. What is to be gained thereafter in knowledge and wisdom must be obtained from a book. Right here manual training steps in; and by means of it, if properly conducted, the little one again sees things, hears things, and handles things. The child is again restored to the outside world, and to happiness.

Labor is apt to be considered disreputable: to work with the hands is looked upon as humiliating. People entertaining these ideas will sometimes resort to follies and crimes, rather than be classed with those who thrive by manual toil. Here, again, a judicious course in manual training steps in and clothes the young person with the honors of usefulness and recognition. Elegant leisure, idleness, and all the resultant follies are not found in his vocabulary.

As a rule, young children do not easily become interested in the study of books. They have small powers to understand, and weak memories to retain what they with difficulty comprehend, and for which they have but little or no use. Hence, if they get on with their studies, it must be done by cramming and learning by rote. Industrial or manual training opens a way to interest them, to develop and employ their perceptive faculties, and to make the otherwise unattractive experiences of school-life cheerful and pleasant.

A great nation engaged in developing its re-

sources, commercial, mining, manufacturing, and agricultural, for the purposes of prosperity and progress, for the comfort and happiness of its people, must have a large increasing force of strong, active, intelligent working men and women. This force of men and women must be educated and trained in the right way from early childhood. Their number has been diminishing of late. Manual training in the schools all over the land will turn the tide, and have a tendency to restore the country more nearly to a normal condition.

Now, is industrial or manual training good for any child or youth? We think so, and for all the children and youth in the land, — for those in the country as well as for those in the city, for the poor as well as the better-conditioned; in short, for all classes and all ages who are engaged in the duties of school. So I think we may be assured that some industry or manual art can be and should be introduced into every country school, whether the cottage by the road-side, or the more pretentious structure for the hamlet, or even the finely constructed institution for the village.

What industry can be profitably introduced? Why, any and every industry within the means of the school, and suited to the capacity, attainments, and age of the pupils in attendance. There are many things that can be done with profit in any and all schools; and, as soon as the pupil enters upon school-life, one of them should be taken up, and each carried forward one after the other, just as the subjects of study are taken up and completed.

SAMUEL G. LOVE.

THE RESPECTIVE FUNCTIONS IN EDUCATION OF PRIMARY, SECONDARY, AND UNIVERSITY SCHOOLS.¹ — I.

It is generally understood that at conferences such as this the papers read should be of a directly practical kind. I have not always fulfilled this expectation, nor do I mean to do so now. And this partly because it seems to me that a conference of teachers should be held to be also a conference of educationalists, and that questions may therefore be quite fittingly treated in those larger relations which, though not exactly philosophical, are at least suggested by philosophy. Another reason for not being directly practical is that I am tired of the practical, and have nothing more to say. In books, lectures, and printed addresses I have exhausted myself, so to speak, and I am not sure that debate on practical questions is now much needed. We have reached that point at

which we wait for action to be taken; and the departmental committee recently appointed, and the universities bill now believed to be in proof, give promise of immediate and salutary activity in many directions.

In primary education the department is now moving on right lines: after many wanderings in the wilderness caused by its own innate perversity, it has now reached the confines, at least, of the promised land. Respectful advice, for the further wise development of the Code, will now be listened to at Dover House, if tendered by competent persons. It has not yet been resolved that 'designated' inspectors who have not been teachers shall go through a course of educational study and scholastic training before entering on duty; but this reform *must* come. As to the training of teachers, the key of the position, as I have again and again pointed out, is the preparatory qualification of the training-college entrant, and this resolves itself into the reform of the pupil-teacher's schedule. This reform the authorities are now considering.

As to secondary education, the first question is the *professional* training of the secondary schoolmaster at our universities; and the second is the better organization of our high schools. I entirely dissent from those who would speak of the secondary system we have as contemptible. On the contrary, I say, without fear of contradiction from any one even slightly acquainted with the history of education, that secondary instruction and secondary schools were never in so vigorous a condition in Scotland as they are at this moment. I also continue to dissent from those who would draw a hard and fast line for the education to be given in primary schools, in the supposed interests of secondary schools. An exception, however, is to be made in those small towns where the secondary school is made easily accessible to the poor man's child, and where the cheap and necessarily inefficient competition of the primary schools tends to starve out the secondary. For secondary education, what we want in Scotland is a permanent commission, elected by the universities and larger school boards, acting as a consultative body under the Scotch department, and empowered to administer a treasury grant of, say, twenty thousand pounds a year in subsidy of local efforts, and on certain conditions as to school staff and organization. With this and a university entrance examination, the secondary schools of Scotland would be in a highly efficient state in less than ten years. The same commission, as regulating the examinations qualifying for the university, and content itself, I am convinced, with a trien-

¹ Paper read at the Educational congress, Edinburgh, on the 31st of December, 1886.

nial visitation instead of an annual inspection of the schools; this visitation being for the sole purpose of reporting on the staff and curriculum. Inspection of such schools, in the ordinary sense of that term, is wholly unnecessary, if not indeed hurtful to the cause of education. The governing body of secondary schools should be an elected committee of the existing burgh boards, with the addition of county representatives; the county being taxed for the support of the school up to a maximum of, say, a farthing per pound. As to the secondary or high-school curriculum, it is long since I reluctantly came to the conclusion that this must, for the future, be mainly on the lines of the German real-gymnasium; Greek, however, being taught, but only as a specific subject to the few. In this way, we get rid of the anomaly of 'modern sides.' These 'practical' opinions I here summarize bluntly, having on many previous occasions reasoned them, and I now pass on to the special subject of my address. 'Education' is a big word as well as a great word. It comprehends every influence that goes to the formation of a mind. No man can give an account of it. A genuine autobiography is an attempt to do so. But in this even a Goethe or a Ruskin will fail. These men, like all others, probably owed as much to those subtle influences which pass unnoticed as to the more self-conscious experiences which it is easy to read, record, and estimate. We who have to do with education professionally are apt to forget this, and to exaggerate the influence of the school. We forget that the ancient Persian presented to the world a fine type of manhood, with no schooling at all, in our sense of the word; that the Greek leapt by one bound into the van of humanity, and knew little but his Homer, a few moral apothegms, and his simple lyre; that the Roman had unfolded all his greatest qualities, and had proclaimed himself the coming master of the world in arms and laws, with little or no literary acquirements. It is not by the Latin or arithmetic we teach the boy that we make him a true or capable man: it is by the life we present for his admiration and acceptance, and, above all, by the life which we live before his eyes. Our lives, and the very movements and gestures and exclamations which reveal our lives, are the most potent of all influences in the education of the young.

I may seem to you to have fallen suddenly in love with the trite and the obvious, and to have come to this, that I would substitute for the philosophy of education a few well-worn truisms and platitudes. And, indeed, you are right; for as one grows older, and has wandered far and wide over the meadow-lands and deserts of the educa-

tional country, dwelt on the history of the education of the race, and pondered the philosophy of the school, one finds one's self back again at the starting-point, in happy company with the crystalized wisdom of the ages. The last function of science can only be to enable us to see truly what is already there before us to be seen, though covered with a veil: the last function of the philosophy of education is to see the ancient facts of our moral relations to each other, and the truth of the ancient truisms, — to see truly what is covered by the veil of words.

So, then, I am not ashamed to utter truisms, and to say that the formative power of the teacher is not in what he teaches, but in what he is — what he is, first, consciously or unconsciously, in himself, as a living and advancing mind, known of all men, and especially of all boys; and what he is consciously to his pupils in respect of aim, method, and manner.

These certainly are very general reflections, and yet of very close and particular application. For if the end of all our school-striving be not what our pupils ultimately *have*, but what they finally *are* — are as receptive beings in harmonious relation with the simplicity, strength, and truth of nature, and as active helpful beings endowed with sympathy, given to sacrifice, subject to duty, courteous in bearing — I say, if this be so, what a multitude of practical lessons for the teacher are implicit in such a conception!

Let me, in this connection, be strictly practical for a moment, and ask the head master of an English school, "Do you believe this that I have indicated to be the true outcome of school-work? Do you *really* believe? You are a Hellenic and Roman scholar, and you are probably a theologian, and know your Bible. Well, then, if you believe it, is there any reason in the nature of things why, for example, your boys should be kept away from a knowledge of other nations and their commercial and industrial relations with ourselves, and those far-reaching lessons of humanity which such knowledge suggests? Is there any reason why the insular pride, insolence, and self-centring of our British boys — sources these of much evil — should not be modified by a knowledge of other nations of men and their claims to our regard? Can you truly promote what you accept as the true end, the life you admit to be the true life, if you do not by means of the facts of human relations lead the boys of wealthy parents to understand their dependence on the poor, and the true significance of the co-operation of capital and labor? Can any good reason, again, be given why you should not protect the boy's future life by giving him some knowledge of his own frame? Do

you not call it on Sundays, when you preach, the temple of the spirit?" I am speaking, gentlemen, of geography, and economics, and hygiene, as school-subjects, and on which a fifth or sixth form boy would be held to waste his time. And so on I might go for pages, criticising existing practice, in the light of general principles, and suggesting the materials to be used for the making of a true man. So potent are general truths, so keenly practical is philosophy, so penetrating are truisms. It is life that truly educates us: it is the revelation to the young mind of moral and spiritual ideas in their prosaic but fruitful relations to the hard facts and stern duties of common day, that is the main purpose of the great English public school, as of all schools. Can any one who has looked at the records of our law courts for the past seven or eight years believe that this instruction is not needed? Can any one believe that it is continuously given?

But let me pass on to consider the bearing of this by no means, I hope, inapt or inept introduction, to the special question which heads this address.

By the common consent of all nations, as well as of physiologists, the life of the body and the mind of man falls into three periods, — the period up to 7, that of the infant school; the period to 14, that of the primary school; and the period from 14 to 21, that of the secondary school and the university. These, I think, may again be subdivided thus: to the age of 5, the age of 5 to 7, from 7 to 11, from 11 to 14, from 14 to 18, from 18 to 21. But I do not propose to deal here with these various subdivisions, but to confine myself to the larger divisions which we have agreed to call primary, secondary, and university.

Now, let us get hold of some leading idea which shall give us at once guidance and a criterion of judgment at all these stages. That idea I believe to be contained chiefly in the word 'nutrition,' — in the primary stage nutrition of feeling, inner and outer, that is to say, of the emotions within and the realities of sense without, and through these, training, *with a minimum of discipline*; in the secondary stage again, nutrition through the hard facts of life and the presentation of concrete ideals, and through these a *maximum of discipline*; in the university stage still nutrition, but now through ideas, with *self-discipline* as the necessary pathway to the apprehension of ideas.

And here I must try to distinguish between training and discipline, terms often confounded. If I carry a child through the explanation of any object of knowledge, step by step, in the true logical order of that explanation, and, repeating this again and again, finally cause him to repro-

duce the process, I am calling into activity his intellectual powers in the order in which they alone can truly comprehend. I am thus training him. If, on the other hand, I call upon him to apply past knowledge to the explanation of some *new* thing, I discipline him. For example: the geologist may explain to me a section of the earth's surface by exhibiting in logical sequence the causes whose operations have made it what it is. As often as I follow him through this explanation my faculties are at work in their natural order, and I am thereby trained. But if the same geologist, knowing that he has conveyed to me through his past instructions, principles and causal forces, takes me to a new section of country and calls on *me* to map it and explain it, he disciplines me. Again: in the moral sphere which concerns doing under the pressure of motives, when I lead a child by the hand and guide him to the feeling of the right motive, and to action in accordance with it, I train him. When I throw him on his own resources, and, withdrawing my fostering hand, call on him to do his duty, which means to sacrifice inclination to the moral 'ought,' — to offer up self to virtue, — I discipline him. Training is the peculiar virtue of the primary school. In intellectual and moral training there is the following of a stronger on whom the weaker leans: in discipline there is the self-exertion of will in the face of difficulties, this will being the root of our distinctive humanity. Training may make a well-disposed youth, but it is discipline alone that makes him strong, virile, — a will, a man. Discipline is the peculiar virtue of the secondary school.

When the primary and secondary schools have attained their end, we have a great result truly; but, after all, our pupil is as yet only a man among men, a capable, upright citizen, it may be. That is all, though much. He is fit for more than this, however. He can rise above mere world-citizenship, and become a citizen of a city not made with hands. The divine in him — his spirit-hood as distinguished from his mere man-hood — claims fellowship and kindred with God. He can rise to the contemplation of ideas, and regard them face to face. The true is an idea: it is the motive inspiration of scientific inquiry. The beautiful is an idea: it is the subtle perception of the music of creation. The good is an idea: it is the comprehension of the harmony of the universal movement. When man attains his full stature and to communion with ideas, he raises his head above the vaporous clouds of earth and breathes an 'ampler ether, a diviner air.' He now begins to see the cosmic order as truly a spiritual order, and, returning to the ordinary life

of the citizen, he descends from his Sinai, not to despise the mean things of the daily life, but now rather to see the God of the mountain-top in them, and to illumine all with the light that comes from within. He no longer sees with the eye of sense. For him nature is now bathed in the light that never was on sea or shore. The glory of setting suns, with all its splendor, is now to him only a dwelling-place for the universal spirit; the infinite variety of nature, only the garment we see Him by. The palpitating thought which *is* all, and in all, now finds in the spirit of man a responsive pulse. Blessed is the coming of that day. It is to sow the germs of this life of the spirit, to foster this into adolescence, if not maturity, that the university exists; to give food, nutrition of this kind, — to supply the spiritual manna which will never fail us in the wilderness-wandering of earthly existence, as each morning we rise to a new day. The discipline of this period is *self-discipline*. Such I conceive to be the three stages of education. These be brave words, some of you, perhaps, will say, but what guidance do they afford? By what cunning application can they be made to bear on the business of the teacher's life? The application will be apparent enough to others. Depend on it, principles are the most practical, the most potent, of all things. They are inexhaustible fountains of every-day detail.

S. S. LAURIE.

THE PRUSSIAN MINISTER OF INSTRUCTION ON FEMALE EDUCATION.

MINISTER VON GOSSLER presided over the tenth annual congress of teachers in high schools for girls at Berlin, at which about five hundred teachers were present. In his opening address, Herr von Gossler discussed female education in general, and stated that the chief difficulties connected with the instruction in girls' schools are two: "first, there are still a great many men and women who hold that a girl's character, and the emotional part of her nature, are the only things that require developing, but that the intellectual side may be left to chance; second, society is at present in such a state, that the question, 'What will become of our daughters?' is uppermost in the minds of the parents and of all true friends of the people. The serious nature of these problems has often led to attempts at introducing things into girls' schools which do not belong to them, and at putting girls in every respect upon an equality with boys. As Teutons and as Christians, we must ever hold that woman has equal rights with man, but on physiological grounds she is not the same in nature as man. Hence the aim of education should be to

recognize this diversity of characteristics, and to build accordingly. It must also be remembered that the school has no claim on girls for as long a period as on boys, — a difference which is based in part on the natural difference of sex, and in part on time-honored custom. The principles on which woman in Germany has been developed, and which are rooted in our nature, must be preserved and handed to our descendants as intact as we found them. Woman here, the centre of all Christian, humane, and ideal thoughts, is rightly considered with us as the centre of the home and the family. The best men and women of all times have always held that the well-being of a nation is based on family-life, on the home, and on woman. I say woman, for I do not mean specially the wife. Therefore our endeavors must be to hand down the nature of woman, with all the perfections inherent in it, unaltered to future generations. Woman belongs to the home, and must live for it: her share in art and science must always be looked upon as a secondary consideration. At a later period of the session, Herr Wübchen-Oldenburg, director of a high school for girls, offered a resolution stating that the object of education for girls should be to train woman to be the helpmeet of man, intellectually as well as otherwise. He claimed that "this aim is not attained — often it is made impossible — through the increase in the number of subjects taught, which leads to superficial knowledge. Hence the subject-matter of the studies is to be restricted rather than extended. It might well lose in breadth in order to gain in depth. The school-course ought to remain as it was fixed at the meeting of 1873, from the end of the sixth to the end of the sixteenth year. The new plan of studies ought to be tried provisionally in Berlin, before applying it to the country at large. The results of the discussions seem to be that the number of school-hours, at least for the four lowest classes, should be diminished, the subjects now taught should be rearranged, and more time should be allowed for bodily exercise.

POLITICAL EDUCATION.

MR. FREDERIC HARRISON, the well-known English essayist and follower of August Comte, is president of the Social and political education league of England. He took for the subject of his recent presidential address 'Political education,' and spoke at some length. He referred to the great political excitement of the time, and pointed out that public opinion needs to be continually reminded, that, if politics is to be fruitful, it must be based on history, law, and philosophy. He

next spoke of the good work being done by the league through their courses of lectures, and incidentally referred to gratuitous teaching in a way that reminds one of the Athenian opponents of the sophists. This principle, Mr. Harrison insisted, is essential to any high standard of educational good.

It is practically impossible to give any adequate remuneration for really good teaching. True knowledge is priceless; the teacher must have been taught by a thousand influences and long generations of teachers; and who would say whence came that idea, or what that particular thought was worth, or how much per hour ought to be paid for good advice? The forming of a mind, the fortifying of a human soul, has no market-price, and is best when freely bestowed. Those who have been taught, ought, by the laws of the chivalry of culture, to teach. It is said that people are apt not to value that for which they do not pay; that the work which is not paid for is not well done. There are no doubt cases where this statement holds good; but no money will buy a competent prime minister or an Archbishop of Canterbury, or can really compensate a good teacher. Mr. Harrison had no objection to paid lecturers in their proper place; but all knew how strong was the inducement for a paid lecturer to amuse rather than to instruct. The teacher ought to be in the position of the higher and wiser helping the weaker and less instructed; and no sophistry or convention could obscure that truth. It is the very first duty of the teacher to make the learner feel his shortcomings, and press him to use his mind more strenuously than before. He hoped that the league would hold on to the gratuitous principle as its very life-blood. The central idea of the league was that politics could be made a subject of systematic education. This idea was the most important discovery of the age; it was the most potent advance made in the history of human thought. Down to the close of the last century it had been thought that the immutable laws of science were possible only in the physical world; and it was only in our present century that a general but vague impression had filled the public mind that there was some such thing as a social science, no less than a physical science. By common consent the science had two great sides,—in Mr. Herbert Spencer's language, the statical and the dynamical. The study of institutions and the study of history, the knowledge of the permanent elements in any society and of the course which that society had taken in its evolution,—these were the two great instruments, going side by side, of their educational work,—the analysis of institutions on the one hand, and the philosophy

of history on the other. The history of England had been studied scientifically only within the present generation, and the effect on the politics of our time was now very visible and profoundly active. Looking at the legislation of the last fifty years, we should find that it had been in a marked and increasing degree based upon something which might be called euphemistically history, social science, and political philosophy. Turn whichever way we would, in legislation we found that statesmen made an effort to get guidance and inspiration from those principles. The idea that they ought to do so, distinguished the nineteenth century from the eighteenth, and the sixteen preceding centuries; and our children in the twentieth century might see the idea fully developed. It was still in an infant, even an embryo, state, and was not a science constituted and systematized. It would be, however, a complete misconception to assume that we could not bring science to bear upon society until it was fully constituted. To bring habits of scientific training to bear on things social is a modest aim enough, but is one which might be of exceeding usefulness in the din of party and the daily battle of bills, clauses, and personal combats. Such lectures as the syllabus of the league comprised, carefully handled by men able to discriminate between knowledge and prejudice, must clear the air and sober the excitement of political debate. We have now arrived at such a stage that we have committed the destinies of races in the aggregate more numerous than those which obeyed Xerxes, or Alexander, or Caesar, to the millions of electors of these islands, and the place of England in mankind rested on the event of that great problem. The board schools, halfpenny newspapers, and cheap literature are not enough for the education of our masters. Mr. Harrison said that he knew something of working-men, and he felt pretty sure that they would never take their opinions from any one, but form them for themselves; and the league, at any rate, did not seek to give them opinions. It was to help in forming and training their minds that the league offered to put them in the path of thinking broadly, cautiously, and with system, and to feel how subtle and orderly a thing was the organization of any human society; and all this might be done without being supposed to have mastered social science, or without wishing to impose upon men indisputable dogmas of any kind. The best education of the present day was very far from reaching a high standard in method, completeness, or coherence; but, such as it was, it must be accepted and used. It would be the unwise course of all to be forever disputing what a good education ought to be, instead of using the imperfect

instrument at command, and trusting to the younger generation to work out for themselves a more truly rational system. He would encourage the friends of the league to continue to extend their work, if not for others, for their own sake. His experience was, that to give a course of lectures was to go through a course of self-education. To lecture was to undertake a very solemn and trying task. It was to lay one's self bare to view, and to ask one's fellow-citizens to judge whether one's education had been of any good worth speaking of. He trusted that with them it would be found that the attempt to teach others proved their own best education.

MANUAL TRAINING AND PUBLIC EDUCATION.¹

"THE public school," said John Quincy Adams, "is one of the four pillars of the state." It is firmly entrenched in the heart of every loyal citizen. It is always on the side of good order and of good morals. The man who has ventured to suggest any important change in the public-school system has been suspected of weakness in his head, or dishonesty in his heart. But here is a radical change from the public school of Horace Mann, of Daniel Webster, and of the host of other worthies who have either aided in its establishment, or have been grateful partakers of its benefits. It is only reasonable to ask, Why this change in the system to which a large part of the prosperity of the country is undoubtedly owing? Why add to the geometry and philosophy which have descended to those quiet halls from the academic groves of Athens? Why add to the poems of Virgil and the orations of Demosthenes, the tool of the mechanic and the whir of modern machinery?

As an instrument of culture,—for it was Emerson who said "a man should have a farm, or a *mechanical craft* for his *culture*,"—the manual-training department of the public school was unnecessary a hundred years ago. As a means of teaching the mechanical arts, it would even then have been an improvement on the apprentice system, although the apprentice then occupied a very different position in the shop of the master. But the New England boy of the olden time, like many a country boy of the present day, had a manual training outside of his school. The Yankee knack at turning one's hand to almost any thing has become proverbial. The mechanical ingenuity of the New-Englander is to be attributed only in part to his literary training. In the early New England life, and in the New England villages in which the pristine habits are preserved,

¹ From the *Industrial world and iron-worker*.

John Fiske remarks, "The universality of literary culture is as remarkable as the freedom with which all persons engage in manual labor."—"The stony and somewhat sterile lands of New England," says the Englishman Mather in his late report to the British parliament, "require intense activity, industry and skill on the part of the farmer, to make a living. As hired labor is very dear, he depends on his own household for help. Every kind of work has to be done at home. Blacksmith's, wheelwright's, machinist's, carpenter's, and hydraulic work becomes as familiar to the farmer, in a rough and ready way, as ploughing, tilling, sowing, and reaping. All handicrafts, in a greater or less degree, are acquired. The farmer's boy is thus provided with an industrial training of the best kind in and around his home. His wits are sharpened, his perceptions developed. There is a large field for the immediate application of knowledge acquired at school, on the one hand; on the other, the school exercises and lessons are more readily understood by a boy or girl having in daily life to deal directly with natural forces and laws. These district schools, holding only twenty weeks in the year, associated as they are with agricultural and mechanical occupations, produce better results, as a whole, among the artisan classes, than the city schools, the attendance at which is for the entire school-year of forty weeks. My attention has been drawn to this fact by many employers and educationists, and it has been confirmed by my own observations. *It suggests the importance of introducing into the elementary public schools of cities some industrial training.* 'Our brightest boys come from the country,' is a phrase which has become very familiar to me in America."

Such are the observations and conclusions of Mr. Mather. That they are true cannot be denied; and since they are true, the reason and the wisdom of this new departure become apparent.

The influence of physical vigor and manual skill in developing sterling character is nothing new. In the virile days of Rome, when "to be a Roman was greater than to be a king," there was a remarkable resemblance to the early New England life.

"The oldest lays of Rome," says Mommsen, "celebrated not only the mighty war-god Mamers, but also the skilled armorer Mamurius." "The Roman boy, like every farmer's son, learned to manage horses and wagon, and to handle the hunting spear." "In the earliest Rome the arts of forging and wielding the ploughshare and the sword went hand in hand, and there was nothing of that arrogant contempt for handicraft which was afterward met with there."

Nor does our own republic fail to furnish us illustrious examples of noble men worthy to be ranked with Cato and Brutus, whom an admiring nation lifted from village or farm to the highest places of honor and power. I need not call the roll from Washington to Lincoln; I need not name Garfield and Grant, and a host of others.

Notwithstanding a popular superstition, there is no necessary antagonism between brain power and muscular power. A man may be a scholar and artisan, as well as a scholar and an artist. Physiology teaches that the brain is best developed by the best development of the body. Dr. Henry Maudslay says, "It is a foolish and fruitless labor to attempt to put asunder mind and body, which nature has joined together in essential unity. The right culture of the body is not less a duty than — is indeed, essential too — the right culture of the mind. The muscles are not alone the machinery by which the mind acts upon the world: their actions are essential elements in our mental operations."

Dr. Edward H. Clarke says, "The development of the soul and mind — of the *ego* — resolves itself into the development of the brain. No perfect brain ever crowns an imperfectly developed body." Dr. Clarke, writing *not* in the interest of manual training, maintains that parts of the brain preside over special muscular movements, and are more or less developed by such movements. And it is a well-known fact that that side of the brain which controls and animates the right hand is, in right-handed persons, larger than the other side; and an eminent living physiologist has lately recommended the training of the left hand of children, in order to increase the brain-power of the race. Of course, it is possible to develop one part of the human organism at the expense of another. We have illustrations of this in the gourmand, frequently in the scholar, too often in the laboring man, driven by stern necessity.

Tyndall remarks, "We need muscle as well as brains, character and resolution as well as expertness of intellect. Lacking the former, though possessing the latter, we have the bright foam of the wave without its rock-shaking momentum."

Before considering some charges brought against public schools, I wish to speak of the opinion which has gained currency in certain quarters, that the advocates of manual training are the enemies of the public-school system. Whatever may be the sentiments of others, this accusation is groundless in regard to myself. To the superiority of the public schools of America I am always ready to bear cheerful testimony. But, in my judgment, the position taken by the friends of manual training in regard to public schools is of

far less importance than the position of the friends of the public schools in regard to manual training. In many cities it is clearly perceived that manual training is neither the enemy nor the rival of the public school, but is an essential part of it.

Both European and American schools must plead guilty to the charge of over-pressure. Medical men testify to the injurious effects of long-continued taxing of the brain combined with inactivity of the body. The public has insisted upon long hours and close confinement of children in school, often against the protests of their teachers. The latter, in their laudable ambition for the progress of their pupils, have fallen into the same error. After making allowance for the ill health due to late hours, improper food, and other causes for which parents are responsible (and this amount is greater than parents will admit), the ill effects of school-life on many children must be acknowledged. It is not surprising that the proposition to make an addition to our already overloaded curriculum seemed to many a move in the wrong direction. The assertion that a pupil could accomplish his regular school tasks, *plus* the manual work, with less tax upon his strength than that demanded by his academic work alone, certainly has the appearance of a paradox. But such is the truth. Improved health, more rapid advancement, greater enjoyment of school, is the frequent voluntary testimony of pupils in manual-training schools, and of their parents. On the other hand, no pupil entering the Chicago manual-training school in good health has, as far as my knowledge extends, ever been withdrawn on account of loss of health from school-work. The manual-training school recognizes the fact that alternation of work is rest. It brings into activity a rested portion of the brain, and permits the restoration of the wearied parts. A course in Latin and Greek, combined with violin and billiards, was lately prescribed for a railway president threatened with softening of the brain from overwork. A cure was effected. Assuming, however, what seems *not* to be true, that the book-work of the high-school boy exceeds in amount that of the manual-training school pupil, it is still true that the best knowledge of the world and of the age in which he lives, and the greatest power to subjugate that world to his own will, is in the possession of the graduate of the manual-training school.

There is a mental discipline obtained from the course in wood and iron working. The knowledge of the properties and laws of matter secured in the laboratories of the manual-training school exceeds the knowledge that can be obtained in the ordinary school. Three years' actual work

with wood, iron, steel, brass, zinc, lead, with plane, saw, lathe, hammer, forge, cannot fail to arouse and stimulate a boy's mental faculties. The high-school boy's knowledge of the laws, powers, and capabilities of modern machinery is nothing. To him this is a *terra incognita*. Mental power is needed to understand a steam-engine, as it is needed to analyze a sentence. If the boy has read three books of Caesar instead of four, but in place of the fourth book, 'De bello Gallico,' is able to describe the working of every part of a Corliss engine, he has not lost mental power by substituting the study of the modern giant for the study of Caesar's bridge. Three years in a training-school undoubtedly fit a boy to grapple with the problems of life better than three years in the high school. In Baltimore, Philadelphia, and Toledo it will be shown that three years in a high school with manual training give a boy a better start in life than three years in a high school without manual training.

It is the belief of many that elementary education should include nothing except a purely intellectual training (with, perhaps, some attention to morals and practical hygiene); and that the school, certainly the public school below the university, has no concern with the trade, business, or profession which the child may follow in after life; and that the public school would be guilty of leaving its true sphere should it give the child any bias whatsoever to any calling. The position is also taken, that, whatever may be his future vocation, this training of the intellect is the best possible preparation which the child can have.

No word of ours shall ever be quoted derogatory to the highest intellectual culture for all men and for all women. This age has justly been called the age of iron, of steel, of steam, of electricity. But it is the age of steel, steam, and electricity because it is pre-eminently the age of *brains*. Any education that neglects intellectual culture, or makes it secondary to any physical training, is an education to be condemned and avoided. A republic should have no proletariat. The education advocated by this paper recognizes the culture of the mental and moral faculties as essential to, nay, as the foundation of, the highest development of the individual, whether artisan or artist, ploughboy or president. It would not abandon, but would, if possible, elevate the high American ideal which would lead every child into the pleasant and fruitful fields of literature and science. But it recognizes the fact that in his present state of existence the boy has a body as well as a mind; and it protests against the mediaeval doctrine that the highest culture of the intellect is obtained

by the mortification or neglect of the physical nature. On the contrary, it asserts that the connection of mind and body, however that mysterious union is effected, is such that the proper training of each is essential to the highest development of the other.

The first great object of education is preparation for the battle of life. To the great mass of mankind this must always be the primary, if not the sole, object of education. The great majority of children leave school at a very early age, averaging probably thirteen years. Many of these children leave school to assist at once in the support of the family; many others to obtain some education, not found in the public school, which shall fit them to earn an honest living.

Every year there is need of a large addition to the number of skilled mechanics. Where is the boy to learn the elements of artisanship, unless in school? Some one has said with, it is to be hoped, large exaggeration, that in America a trade can be learned nowhere except in jail. Why not teach in school the elements of carpentry as well as the elements of book-keeping? Why bias the boy in the direction of an accountant's life, and not in the direction of house-building or cabinet-making? Is the one art more essential than the other?

A boy can be taught in school the use of a plane as well as the use of a pen, the use of the lathe as well as the use of the lexicon. He can be taught the use of tools *scientifically* better than the 'rule of thumb.' He can be taught by a skilled mechanic who is also a skilled teacher, in less time than by a skilled mechanic who is not a teacher. Teaching is an art, and the highest success in it demands more than the simple knowledge of the matter to be taught.

There are in the public schools of the United States more than ten millions of children. We develop their *brain* power, we let their *hand* power lie inactive. It is no exaggeration to say that of these ten millions, soon to become men and women, two and a half millions must support themselves by the labor of their hands. What are the public schools doing to train these hands?

Say what we will, the old Greek was right: "Teach the boy what the man will need." For a nation of horsemen and warriors the ancient Persian education was admirable: to ride, to shoot, and to speak the truth.

It is a remarkable fact — no, it is *not* a remarkable but a very suggestive fact — that the American Indian is taught, in the schools of the American missionary society, exactly what he needs to make him a self-supporting, self-reliant, upright man. The foundation of his scholastic training includes four R's, the fourth being *religion*. These

occupy half his time : in the other half he learns to till the soil, to build his house, to repair his plough and his wagon. But it is remarkable that the white man should give to the Indian child a more comprehensive education than he gives his own. The gravest problem that confronts the American people is the education of the masses. Our wealth has increased, but so has our poverty; our learning, but our ignorance also; refinement and joy, but also degradation and misery. The march of civilization has also been the march of vice and crime. "Knowledge fights on both sides in the battle between right and wrong." "The association of poverty with progress," says Henry George, "is the great enigma of our times. It is the riddle which the Sphinx of Fate puts to our civilization, and which not to answer is to be destroyed." Can the riddle of the modern sphinx be solved? Can the diseases of society be remedied? While I am firmly convinced of many advantages arising from hand and brain training, I do not regard it as a panacea. No single agency can bring immediate and permanent relief to the body politic. The mob that cries for 'blood or bread' has passed beyond the influence of the school, and demands a sterner discipline. The hope of the state lies in its youth. Too long have our schools inculcated a taste and an admiration for purely intellectual accomplishments; at least, have cast a slur on the development of manual skill. By far too many has education been regarded simply as affording an avenue of escape from all labor, as the ability to 'live by one's wits.' We rejoice, then, in the extension in several cities of the public-school course. We believe it to be a broader and a wiser education; that it is based on a true philosophy; that it calls into activity powers that have lain dormant, powers of the mind as well as of the body; that it develops a manlier, more self-reliant spirit; that it elevates industry, and teaches respect for true manhood and womanhood under whatever guise. We believe that it will materially assist in solving the problem of modern civilization, since, to use the words of William Humboldt, "whatever we wish to see in the life of a nation, we must first put into its schools."

H. H. BELFIELD.

THE REAL-GYMNASIUM.¹

WHILE in Prussia and North Germany the contest over the relative advantages of the training given in the real-gymnasium and that concerning its rights and privileges has been gradually assuming a very violent character, there has been de-

veloped in Wurtemberg a real-gymnasium — the one at Stuttgart — so quietly and peacefully, and so well encouraged by those who in Prussia are the real-gymnasium's bitterest opponents, that the Swabians may rightly be envied for the progress they have made in this direction. This development is described in the work mentioned above, and with the avowed intention, successfully carried into effect, of conciliating the opponents of this new form of school. The author considers himself called upon for these words of conciliation and explanation, from the fact that for twenty years he has been the rector of this institution. Inasmuch as the real-gymnasium in Stuttgart has met with but slight opposition, the author, in his position as rector, has been able to observe quietly the effects which this system of education must have upon his pupils. It is seldom that we see the two educational forces, language and mathematics, with their influences on children, youths, and men, so impartially weighed as in this case.

The history of the Stuttgart real-gymnasium is very interesting for a Prussian, because there the teachers in the gymnasia are its friends, while those in the real-schulen where Latin is not taught are its opponents. It is not possible to enter into this subject more fully, and I will content myself with a few remarks that may induce the reader to refer to the book itself.

In regard to rights and title, the author demands with emphasis that those of the real-gymnasium should be equivalent to those of the gymnasium. The delay in this matter appears to him an injustice, but he does not wish to interfere with the authority vested in the gymnasium. Up to this date the ministers of the interior and of finance in Wurtemberg demand from the graduates of the real-gymnasium a supplementary examination, in which the necessary answers are translated into French instead of into Greek, for entrance to the higher courses of study in their departments, and those who succeed are entitled to follow the studies offered by the faculties of philosophy, natural science, and political economy. To qualify for studying in the other faculties, there is only an examination in Greek, and a translation of German into Latin, required, and not a Latin essay. This is an important concession in comparison with the Prussian demands. The real-gymnasium in Stuttgart is founded for, and expressly appointed to prepare, students who do not study Greek in the gymnasia for entering the courses offered by the above-mentioned faculties, as well as in the technical high schools. It should be a model for all Germany. For once, students have in a very satisfactory manner received

¹ A review of C. Dillman's 'Das Real-gymnasium,' translated for this journal from *Pädagogisches Archiv*.

the highest marks in examinations, and have shown themselves equal, if not superior, to the students of the gymnasia. This fact has been substantiated by the minister of state, Dr. von Sich, in the public records, as well as in private letters. Six former pupils have gained professional chairs in the high schools, and among them three are in Prussia. These, as well as the pupils from Principal Krück in Wurtzburg, for Bavaria, and from Principal Steinbart in Duisburg for North Germany, have given convincing proofs that the educational system of the real-gymnasium is equivalent to that of the gymnasium. Since the study of Latin in the real-gymnasias was increased in 1882, the faculties of law will scarcely be able to oppose any longer the admission of their graduates. The one in Stuttgart has furnished proof that they are able to understand the institutes and pandects, as they have passed very good examinations in these branches.

Twenty years ago the author laid down this proposition: that, in order to preserve the proper cohesion in our education, the realist should be educated in a more humanitarian manner, and that through the one-sided humanitarian education given in the gymnasia the connection between life and the school was severed, while it gave just cause for the objections raised against the gymnasial system. The Prussian government has tried to remedy this defect, and mediate between the two systems of education. It has made the earlier real-schulen more like the gymnasia by increasing the amount of Latin, and has made a real-gymnasium out of the former real-schule. That this must bring an increase of privilege is clear.

Du Bois-Reymond, formerly a violent opponent of the system, now desires to open the profession of medicine to the students of the real-gymnasium, and the faculty of that science in Tübingen no longer opposes this concession. According to our author, the free entrance to all the faculties will eradicate this *Kulturkampf* which now threatens to waste the best power of the German people. The author considers the question concerning the privileges of the gymnasium in a very direct way. The teaching of Greek in a high school is a distinguishing mark as to whether it is a gymnasium or not. In the beginning of this century, Greek was an essential part of the study in *no* gymnasium. Herder, Lessing, Schiller, and Goethe first drew the nation upon classic ground, and the German student was obliged to follow if he wished to be in accord with the spirit of the age. Latin formed the basis; and because it was so strong, the superstructure Greek attained such fine proportions. From this the author draws the conclusion, that because the gymnasium's teaching was sustained by

the approval of the greatest among the people, and supported by the whole spirit of the times, it has received its sudden impulse during the last fifty years; and that the system of education can only reach its highest point of development, and at the same time attain the ability to influence the age we live in, as well as instruct the young, when it is in accord with the ideas that are agitating the world, gaining its incentive from them, and in its turn placing them before the young. Latin is *the* language of the gymnasium. As long as the real-gymnasium makes a point of Latin instruction, and with all earnestness and power interests itself in the teaching of that language, it has a right—an historical right—to be a gymnasium, to be called by that name, and to be recognized as such.

Max Müller, professor in Oxford, and the greatest living philologist, replied to a committee of Hungarians who asked him whether they should introduce the system of gymnasia as it existed in Germany, that Latin was indispensable, as our whole culture rested upon that language, and that Greek should, if necessary, give way to it.

Upon many sides the old question concerning Greek is renewed, whether one must study Greek literature and customs, through the reading, necessarily in a bungling way, of the original. The author thinks, that for the teacher, with his attainments and enthusiasm for Grecian antiquity, this is essential, but not for the pupil.

Von Rümelin, always a conservative friend of the gymnasium, says that the important works of the Grecian authors are too difficult for any except the most gifted as well as the most studious pupils of the gymnasium.

The philosophers themselves use a translation of Plato's 'Republic' by Schleiermacher, and why should not a student of the higher classes read a translation of one of the tragedies with more aesthetic appreciation than he could feel in stumbling through a few strophes from one of the choruses?

Never was there a greater number of classically educated men than in the assembly held at Frankfurt-a.-M. in 1848. Never did assembly have a meeting less productive of results, nor one with a more lamentable ending. Yet it held the noblest enthusiasm, and its members had the best intentions. The ability to create something great and lasting was totally lacking; and an eminent writer in the *Allgemeine Zeitung* pronounced the hard judgment that the old gymnasial system weakened the spirit of energy and enterprise.

The majority of men whose names and deeds have become historical have not been trained in the gymnasium. Among them are Thorwaldsen,

Schliemann, Hermann, and the officers of our army, while the most ardent friends of the gymnasium have never been able to consider Bismarck's inclinations favorable to this system of education.

David Friedrich Strauss, a philologist of a very high order, the embodiment of the critico-philosophical method, a master of both poetry and prose, who, like Luther, took a firm hold upon our nation, was a general without an army. The mighty thinker lives forgotten and unknown. In the evening of his life the meteoric splendor of his name brightens the world once again. In his 'Old faith and new' he falls without judgment or method upon the newly risen star of Darwinism to extinguish it. His classical education remained narrow and partial, so that he lacked the organ for comprehending and justly judging a theory of natural science.

This will be sufficient to create a desire to read the pamphlet. The requirements in supplementary examination in Greek and Latin demanded from the graduate of the real-gymnasium in Prussia since 1882 are severe, and perhaps too difficult for a man of ordinary talents; still it is to be hoped that they will be partially or entirely set aside when among us also the hard and bitter fight concerning authority gives place to a more judicial state of mind, and the government of the schools shall show greater signs of shifting their ground.

MODERN METHODS FOR BEGINNERS IN LATIN.

THE boy of the present day has no idea of the advantage he enjoys over the boy of the last generation in respect to ways and means of attaining a knowledge of the ancient languages. No drearier memory haunts the mind of the writer than that of the twenty months or more in his youth devoted to the acquisition of Latin accidence. The theory of his instructors was that the promised land of actual Latin literature was only to be entered after the full tale of disciplinary wanderings through the woful deserts of declensions and conjugations and rules and exceptions, and, above all, the dismal wastes of the manufactured Latin in which Dr. Arnold has embalmed the virtues and vices and miscellaneous sentiments of Balbus. It is painful to think how amazed the well-meaning instructors of that day would have been at the very name of the little book which is now so deservedly popular, 'Six weeks' preparation for reading Caesar.' Yet this name very accurately illustrates the prevailing tendency in pre-

paratory work. It is becoming an established principle with thoughtful teachers that no more in Latin than in English is parrot-like ability to repeat a vast number of grammatical forms and rules an indispensable prerequisite to the reading of an interesting narrative written in a simple style. The mediaeval idea that grammar as an abstract science is well adapted to the development of immature minds has at last succumbed to the stubborn resistance with which such minds have instinctively met all attempts at such development. How many teachers who have ever undertaken to pursue the old plan in respect to grammar, whether of the vernacular or of foreign languages, can recall a single pupil who did not pronounce the subject 'awfully dry'? Such a case is as rare as the juvenile prodigy that professes really to like the old-fashioned arithmetical cube root. But in the skilful evolution of a grammatical principle out of some striking passage of Irving or Caesar, what boy will not find interest?

For the tyro, as for the scholar, the true and natural method of mastering the logic of a language is to seek it in the literature of the language. The consciousness of this truth is the basis of the modern tendency to get the beginner in Latin into immediate contact with Caesar as soon as possible. There is some lagging yet among the older generation of instructors as well as among the less energetic. It requires more labor on the teacher's part to so employ the new method than to cling to the old. Equipping a boy with grammar and reader, and seeing that he memorizes a certain amount each day, constitutes the bulk of the teacher's work under the antiquated system. But to secure to the pupil in three months such familiarity with the forms and meanings of words and the leading principles of syntax as shall prove an efficient armory in the attack on connected prose, demands a degree of discriminating and intelligent care that is to be found only in the really capable instructor. For the presentation of the forms and syntactical principles necessary under the new plan, a large number of excellent text-books have already been offered to the public. It has been left to the thoroughly competent instructor of the Adelphi academy of Brooklyn to furnish a handbook of great value in the acquisition of a vocabulary of Caesarian and Ciceronian words. The basis of the plan presented in 'Latin word-building' is the belief that the aptitude of the juvenile mind for the detections of resemblances in the orthography and sound of words is the most useful quality to employ in the formation of a vocabulary. Accordingly, Mr. Gates has collected in alphabetical order the root-words

that occur in the first four books of Caesar, and has appended to each its principal derivatives as employed by Caesar and Cicero. In a second part are arranged sentences containing the words given in the vocabulary, and illustrating their use. The sentences are *bona fide* excerpts from the authors mentioned. By way of appendix, a chapter is added on the main principles in the formation of derivatives, and exercises on the declensions and conjugations.

The author's theory is, that the memorizing of the primitives, and the perception of the general principles in the composition of words that will soon arise from practice, will prove the shortest and at the same time the most effective means to the attainment of a vocabulary. There can be no doubt that the theory is a sound one. The little book before us contains an outline of the practical application of the theory. That the plan may be carried out indefinitely is obvious, and the author has accordingly left space after each root-word for the insertion of new derivatives as they occur in the pupil's later reading. The lists given in the book are in general exactly suited to the elementary character of the work. No pretence is made to fine-spun etymological accuracy. Words cognate to the root-words, as well as those derived from them, are grouped together. It is likely that in some cases the connection of words given as derivatives with the root-words will be found too remote for the beginner. *Cavtes*, for example, from *acuō*, involves a rather profound etymological principle. *Bellum* from *duo*, *vates* from *for*, and *primus* from *prae*, would not be easily grasped by a twelve-year-old boy. So, too, it would probably be as useful for a beginner to put *copia* and *imperium* among the primitives as to class them as derivatives of *ops* and *paro*. Some etymologies appear which are not only quite doubtful, but are apt to be very misleading. Such are *merces* from *cedo* (instead of *mereo*) and *clemens* from *mens*. *Pollex* from *valeo*, and *cervix* from *veho*, are probably doubtful, and certainly not useful in this book. But, in spite of such little inaccuracies in detail, there can be no question as to the value of the book in general. Many a struggling teacher will arise and call blessed the man who conceived and brought forth the little manual.

W. A. D.

SOME RECENT CLASSICAL PUBLICATIONS.

Aeschylus: the seven against Thebes. By A. W. VERRALL, M.A. New York, Macmillan. 8°.

THE literary interest that one feels in the 'Seven against Thebes' is of a purely negative kind. The play has always served as a striking illustration of

the divergence between ancient and modern criticism, both in theory and in practice; for while antiquity gave high rank to what is very little more than a dramatic monologue, or rather series of monologues, modern literary judgment has been much less favorable. Mr. Verrall, in the very admirable introduction now before us, has attempted to show that the modern view is based upon a number of "misconceptions, small in themselves, but not small in their effects;" yet he is nevertheless constrained to admit that there does exist a certain incongruity in the combination of extremely rapid, even hasty dramatic action, and the measured pomp and stateliness of the Aeschylean dialogue. In fact, as he well points out, the structural slowness of iambic verse is always open to the charge of inappropriateness, and when used by Aeschylus, who knew not the metrical arts of his successors, the discrepancy between the exigencies of the action and the measured rhythm of the verse becomes a serious bar to the success of a play like this.

Mr. Verrall has in general performed his task well. Scholars who have only known him by his 'Medea' will be agreeably disappointed in the present volume; for in it he exhibits a much riper scholarship, a much more original style of treatment, and a wider range of vision. In fact, he seems to have profited greatly by a very thoughtful criticism of his former work, which appeared some years ago in the *Philologischer Anzeiger*, by Dr. L. Schmidt, — a criticism to which, in fact, he has made a direct reference in the smaller edition of the 'Medea.' In the present commentary he is even more to be commended for what he has rejected than for what he has advanced new. While following the text of Wecklein, he has had the courage to restore some of the older readings, and, furthermore, has been able to defend them with much sagacity and taste. Thus in v. 998, where modern editors have almost universally read *εἰνοία* from the late manuscripts, Mr. Verrall properly restores *εἰναία*, making it a substantive with *χθονός* depending upon it, — a reading that is not new, for it was defended by the scholiast, yet which has seldom been properly understood. Mr. Verrall rightly justifies it by referring to the *πρὸς χθονός* . . . *πάρεμνον* of vv. 993–995, and also to the ironical sentence in v. 1012, which loses much of its point if we read *εἰνοία*. In many other passages Mr. Verrall shows a similar good judgment and sober discrimination. We might, perhaps, reasonably join issue with his assertion, on p. 33, that *μαίνων εἰσέβειαν* necessarily requires a personification of *εἰσέβεια* to make tolerable Greek; for such passages as Pindar, N. III. 25, Soph. Antiq. 1044, and Eurip. Hipp. 1437, make the

ordinary usage so common as to require us to regard the non-personification in the present passage simply an Aeschylean turn of expression, by no means far removed from the language of ordinary verse.

Typographically the book is superb. A more beautiful edition of a classic one can hardly remember to have seen; and the excellent scholarship of the editor deserves the sumptuous setting.

Selections from Tibullus and Propertius. By G. G. RAMSAY, LL.D. Oxford, Clarendon pr. 16°.

Professor Ramsay has long been favorably known by his edition of his father's commentary on Ovid, — a book that has become very popular in the classroom as a practical and judicious work. The present collection of selections from Tibullus and Propertius is therefore sure of a favorable reception, though the necessity of a second edition of Propertius so soon after the publication of Professor Postgate's admirable little book might be questioned. However, Mr. Ramsay has adopted a different principle of selection, and has in view a more mixed public than that for which Professor Postgate wrote his commentary.

Caesar: book iv. of the Gallic war. By C. BRYANS, M.A. New York, Macmillan. 24°.

The fourth book of Caesar's 'Gallic war' appears in a neat little volume by Mr. Clement Bryans of King's college, Cambridge. It contains a series of Caesar primers, books i., ii., and iii. having previously appeared. It contains a vocabulary, and a set of notes that are good in their way, though scarcely full enough for the lower forms of the schools, where such a book, no doubt, must find its most numerous purchasers.

Livy: the last two kings of Macedon. Selected and edited by F. H. RAWLINS, M.A. New York, Macmillan. 16°.

A thoroughly worthless and slovenly piece of work is the edition of that portion of Livy's history relating to the kings of Macedon, and culled from books xxxi.—xxxiv. by Mr. F. H. Rawlins. The editor represents a certain set of English scholars who have yet to learn that classical scholarship has advanced in many ways during the past fifty years; and that philology is a science, and not a game of guess-work. The notes to this volume show an amount of imagination, credulity, and complacent assumption of knowledge, that would be amusing but for the fact that some of the purchasers of the book may take it seriously, as entitled to respect. A single specimen nugget from the editor's attempts at philological discussion may serve to entertain the reader.

"*Luxuria*," says Mr. Rawlins (p. 133), "by its derivation, implies a divergence from the line

of right. Similarly *scelus* is akin to *σκολιός* ('crooked').".

Now, this is all very pretty and ingenious, but unfortunately Mr. Rawlins has been misled by his desire for making etymology enforce a moral lesson, into a confusion of *luxus* from $\sqrt{\text{LAK}}$, with *luxus* from $\sqrt{\text{LUC}}$ or ultimately $\sqrt{\text{RIK}}$. On p. 122 he has not even a great ethical purpose to plead, in his attempt to explain *dubius* as cognate with *βαίνο*, *βάσις*, and hence rendered 'going two ways.' A few references to Corssen would have prevented such unnecessary errors as these, and many more besides.

H. T. PECK.

TWO WORKS ON PEDAGOGY.

THESE two books on the same subject, by experienced teachers, have, as might be expected, many points in common.

Both authors are well known in the educational world, Dr. Hewett being the president of Illinois state normal university, and Mr. White being the superintendent who has undertaken the re-organization and development of the Cincinnati public schools.

Both books are written after considerable experience in teaching, and both insist on basing pedagogy on psychology. This is the chief merit of each of these works. They tell us in unmistakable language that the day of empirical teaching is over, and that hereafter the teacher must know not only the subject to be taught, but also the pupil to whom it is to be imparted. While repeating that this insistence on psychology as the foundation of pedagogy is the peculiar merit of these books, yet we must add that in both, the psychological chapters are far less valuable than the strictly pedagogical. The authors would seem to have seen a fundamental truth in outline only: the power to develop it and grasp it in detail they show little evidence of possessing. Then, too, their psychological nomenclature and terminology are not always the best and most exact.

The pedagogical portions of these books, particularly Mr. White's, are very good. Mr. White deduces from psychology seven fundamental principles of teaching, which are these: 1°. Teaching, both in matter and method, must be adapted to the capability of the taught; 2°. There is a natural order in which the powers of the mind should be exercised, and the corresponding kinds of knowledge taught; 3°. A true course of instruction for elementary schools cuts off a section of presenta-

A treatise on pedagogy. By EDWIN C. HEWETT, LL.D. Cincinnati, Van Antwerp, Bragg, & Co. 12°.

The elements of pedagogy. By EMERSON E. WHITE, LL.D. Cincinnati, Van Antwerp, Bragg, & Co. 12°.

tive, representative, and thought knowledge each year; 4°. Knowledge can be taught only by occasioning the appropriate activity of the learner's mind; 5°. The primary concepts and ideas in every branch of knowledge must be taught objectively in all grades of school; 6°. The several powers of the mind are developed and trained by occasioning their natural and harmonious activity; 7°. In the teaching of any school art, clear and correct ideals should inspire and guide practice.

There seems to us to be more profundity in Mr. White's treatment of pedagogy than in Mr. Hewett's, and for that reason we recommend it rather than the latter. Mr. White's conception of the plan of methods in teaching is good, and he shows no disposition to push it beyond its legitimate limits. His chapter on teaching geography shows an acquaintance with the latest advances in that hitherto greatly neglected subject; and the syllabus of oral lessons on home geography brings out, in a way that any teacher ought to be able to appreciate, the points to be touched on in such a course, and their connection with each other. Mr. Hewett's book contains nothing so good as this, but it does contain a short passage on an entirely different subject which deserves quotation; for it presents a question now in the fore-front of all educational discussion. It is as follows: "Teaching can never become a profession in the same strict sense as law or medicine, so long as the majority of our schools are in session but for a few months in the year, and pay such small wages to the teacher; nor so long as the oversight of the work is committed to persons outside of the profession; nor so long as the majority of teachers follow the employment for a few years only. But the time may come when the person who makes teaching a life-work, and who brings to it the talent, energy, and special preparation which other professions demand, will receive all the respect and deference that are considered due to the members of other professions. How soon this time shall arrive depends chiefly on teachers themselves: there is no conspiracy on the part of the people to keep teachers below the position to which their worth entitles them, and it is the solemn duty of every teacher to make his full contribution to the sum of influences that shall raise teaching to the height it ought to occupy by virtue of its transcendent importance."

THAT Prof. Clifford Lloyd Morgan of University college, Bristol, is about to publish a 'Text-book of animal physiology,' is an announcement that will give great pleasure to those who have followed his previous work, especially the lucid

articles which occasionally appear in *Mind* over Professor Morgan's signature. The volume aims to satisfy the requirements of those who expect to pass the local examinations of Oxford, Cambridge, and London universities. Its first part deals with the anatomy and physiology of vertebrates, as exemplified by the frog, the pigeon and fowl, and the rabbit. In this part there are special chapters on histology, embryology, the genesis of tissues and organs, and animal metabolism. The second part is occupied with the structure and life-history of some invertebrate types; viz., the crayfish, cockroach, earthworm, liver-fluke and tape-worm, snail, fresh-water mussel, hydra, vorticella, and amoeba. Numerous outline woodcuts have been drawn specially for this work.

—The following is the report given by the *Athenaeum* of the paper on 'Recent psycho-physical researches,' read before the Aristotelian society on Feb. 21 by Dr. J. M. Cattell of Philadelphia. The lecturer said that "the present business of psychology seems to be to investigate the facts of consciousness by means of observation and experiment. As an example of the application of scientific methods to the study of mind, he gave an account of experiments he had made on the limits of consciousness and the time taken up by mental processes. It is possible to measure with great accuracy the time we need to perceive, to will, to remember, and to think. These times are quite constant: we can find to the hundredth of a second how long it takes to see the color blue, or to call to mind that Paris is in France. We thus find that a word can be seen in about the same time as a single letter, that some letters are more difficult to see than others, and get other facts which have practical and educational bearings. They are also of theoretic interest. Life is not measured by the years we live, but by the breadth and rapidity of our thoughts. Besides determining the rate at which we think, such experiments in other ways throw light on the nature of thought, and help us to put the facts of mind into the great order which is the world."

—Professors Horsley and Schäfer recently presented a paper to the Royal society, on some experiments made by them upon the functions of the cerebral cortex. Professor Horsley has within a year operated upon thirteen patients, in ten cases removing portions of the brain and in three cases portions of the skull. In these experiments he used precisely the same anaesthetics and antiseptics as he had employed in his experiments upon the brains of monkeys, and in no case had the patient complained of any pain being caused by the operation.